

CAZONER59

76 H18

HAMILTON—WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

ecologistics limited

july 1976

HAMILTON REGION CONSERVATION AUTHORITY
GRAND RIVER CONSERVATION AUTHORITY
HALTON REGION CONSERVATION AUTHORITY
NIAGARA PENINSULA CONSERVATION AUTHORITY

HAMILTON PUBLIC LIBRARY

REFERENCE COLLECTION

**GOVERNMENT DOCUMENTS DIVISION
HAMILTON PUBLIC LIBRARY
55 YORK BLVD.
HAMILTON, ONTARIO
L8R 3K1**

HAMILTON PUBLIC LIBRARY



3 2022 21335847 2

A

HAMILTON—WENTWORTH
REGION
ENVIRONMENTALLY SENSITIVE
AREAS STUDY

ecologistics limited

july 1976

HAMILTON PUBLIC LIBRARY

MAY 26 1977

COPY 1

HAMILTON REGION CONSERVATION AUTHORITY
GRAND RIVER CONSERVATION AUTHORITY
HALTON REGION CONSERVATION AUTHORITY
NIAGARA PENINSULA CONSERVATION AUTHORITY

SUMMARY

This report presents the results of a study of the environmentally sensitive areas in the Hamilton-Wentworth Region which was commissioned by the four conservation authorities in the area. Such environmentally sensitive areas are those natural landscapes including those lands and/or waters of inherent biological sensitivity, such as those areas supporting aquifer recharge; stream headwaters; unusual plants, wildlife or landforms; rare or endangered species; or other combinations of habitat and landform which could be valuable for scientific research or conservation education. They are the important remaining elements of our natural environment. As such, their environmental importance should be recognized, and they should be protected so that they may continue to support the ecological systems of the Region.

This study involved an extensive inventory of groundwater, soils, landforms, surface water, plants, mammals, reptiles, amphibians and birds. Based on nine selection criteria and these inventories, forty-four environmentally sensitive areas are identified in the report. Fifteen of these areas are noted as 'A' status, fulfilling four or more of the selection criteria. Twenty-three of the areas are 'B' status, meeting less than four criteria. Other areas are included that require further investigation. The Hamilton-Wentworth Region is indeed very rich in unusual ecological features.

The sensitive areas identified range from the 6,000 acre Dundas Valley to the small Hydro Islands in Hamilton Harbour. The features that make the areas so special range from geological and recreational features of the Niagara Escarpment to some of the few Canadian occurrences of rare plants, animals and insects. If these sensitive features can be protected, an essential, but endangered, part of the Hamilton-Wentworth environment will be preserved.

A significant result of the study was the creation of a data bank on the Region's environment. This information becomes the property of the four conservation authorities who will maintain and add information to this basic source.

ACKNOWLEDGEMENTS

The study was initiated by the Hamilton Region Conservation Authority and conducted for them by Ecologistics Limited. Three other authorities supported the study financially, and the planning staff of the Regional Municipality offered advice. Special assistance to the study was provided by Frank Shaw, B.Sc., Assoc. AIP. and George McKibbon, M.E.S., Assoc. AIP. of the Hamilton Region Conservation Authority.

STUDY TEAM

- | | |
|----------------------------------|----------------------|
| - D. J. Coleman, Ph.D., M.C.I.P. | Project Co-ordinator |
| - P. F. J. Eagles, B.Sc. | Project Manager, |
| | Birds, Plants |
| - J. C. Fox, M.Sc. | Soils, Geomorphology |
| - M. E. Baldwin, B.Sc. | Water, Fish |
| - S. A. Findlay, B.Sc. | Biology |
| - W. B. Smith, B.Sc. | Groundwater |
| - C. A. Campbell, B.A. | Reptiles, Mammals |

LIAISON AND REVIEW COMMITTEE

- | | |
|-------------------|------------------------|
| - F. Shaw | Chairman |
| - G. H. McKibbon | Secretary |
| - D. J. Coleman | Ecologistics |
| - P. F. J. Eagles | Ecologistics |
| - P. Attack | Halton Region |
| | Conservation Authority |
| - J. Manicom | Niagara Peninsula |
| | Conservation Authority |



Digitized by the Internet Archive
in 2026 with funding from
Hamilton Public Library

<https://archive.org/details/32022213358472>

LIAISON AND REVIEW COMMITTEE

- J. I. De Vito
- M. Afsar
- J. Winters

Grand River
Conservation Authority
Region of
Hamilton-Wentworth
Ministry of
Natural Resources

During the course of the study, many people contributed generously of time and information. They are so numerous that they are noted as a special appendix.

TABLE OF CONTENTS

Summary	ii
Acknowledgements	iv
Table of Contents	vi

SECTION ONE: THE SENSITIVE AREA STUDY

INTRODUCTION	1
ENVIRONMENTALLY SENSITIVE AREAS	2
THE STUDY APPROACH	4
SELECTION CRITERIA FOR SENSITIVE AREAS	6
IDENTIFICATION AND DELIMITATION OF SENSITIVE AREAS	7
THE HAMILTON-WENTWORTH ENVIRONMENT	12
- Surficial Geology and Landforms	
- Areas of High Water Table and High Infiltration	
- Streams and Sampling Stations	
- Biological Communities	
THE HAMILTON-WENTWORTH ENVIRONMENTALLY SENSITIVE AREAS	23
DATA SHEETS AND DATA BANK	28
LITERATURE CITED	30

SECTION TWO: SENSITIVE AREA DATA SHEETS

1. Beverly Swamp
2. Valens Conservation Area
3. Fletcher Creek Swamp Forest (Crieff Bog)
4. Crieff Old Field Complex
5. Beverly Sparrow Field, Hyde Tract and Rockton Tract
6. Rockton Wetland
7. Westover Wetland
8. Westover Drumlin Field
9. Forestry and Wildlife Area
10. Hayesland Forestry Wildlife Area

SECTION TWO: SENSITIVE AREA DATA SHEETS (cont'd)

11. Millgrove Woodlot
12. Donald Farm Wetland
13. Christie Conservation Area
14. Spencer Gorge (Webster's and Tew's Falls)
15. Borer's Falls - Rock Chapel
16. Royal Botanical Gardens - Cootes Paradise
17. Langford Forest
18. Southwest Summit Wetland
19. Copetown Bog
20. Dundas Valley
21. Tiffany Falls
22. Hamilton Mountain (Radial Line)
23. Ancaster Creek Headwaters
24. Hamilton Niagara Escarpment
25. Redhill Creek - King's Forest
26. Felker's Falls and Niagara Escarpment
27. Niagara Escarpment - Devil's Punch Bowl East
28. Hydro Islands
29. Toll Gate Ponds
30. Redhill Creek Marsh - Van Wagner's Marsh
31. Stoney Creek Ponds
32. Saltfleet Woodlot
33. Tweedside Forest
34. Woodburn Floodplain
35. Twenty Mile Creek Floodplain Forest and Meadows
36. Hannon Floodplain Forests
37. Sinclairville Lowland Forests
38. Hamilton Golf and Country Club
39. Jerseyville Road Woodlot
40. Tyneside Woodlot
41. Mountsberg Wildlife Area
42. Bronte Creek Ravine
43. Carlisle Swamp
44. Lake Medad

SECTION THREE: APPENDICES

1. MAMMALS OF THE REGION
2. FISH AND WATER QUALITY IN THE REGION
3. BIRDS OF THE REGION
4. REPTILES AND AMPHIBIANS OF THE REGION
5. PLANTS OF THE REGION
6. ACKNOWLEDGEMENTS
7. TERMS OF REFERENCE

Section 1: THE STUDY APPROACH

THE SENSITIVE AREA STUDY

INTRODUCTION

This report was commissioned by the Hamilton Region Conservation Authority as part of their input to the official plan being prepared by the Regional Municipality of Hamilton-Wentworth. In addition, the Grand River Conservation Authority, Niagara Peninsula Conservation Authority and Halton Region Conservation Authority supported the study because parts of their watersheds are included in the Hamilton-Wentworth Region.

The objective of the study was to identify the major, significant natural features - "environmentally sensitive areas" - of the Regional environment that should be recognized and protected by the new official plan. The terms of reference (Appendix 7) suggested the following work program:

1. Adoption of general criteria for defining environmentally sensitive areas;
2. Inventory of data sources and interviews with knowledgeable local persons and agencies;
3. Analysis of data to define areas which met the criteria;
4. Delineation of individual sensitive area boundaries and description of their features;
5. Commentary on management of or potential interference with the areas.

This report consists of three major sections:

- this first section generally describing the study and its results
- a section of data sheets on the sensitive areas
- appendices of supporting data

Further to this first section, the following pages discuss the techniques employed by us, the nature of the environment of the Hamilton-Wentworth Region and the summary of sensitive areas.

ENVIRONMENTALLY SENSITIVE AREAS

The glaciers left this land about 10,000 years ago. Since that time the living fabric of life moved over the land and clothed it in forest.

Ecosystem development continued for those 10,000 years until the settlers moved in, approximately 200 years ago, and changed the biological fabric. With settlement much of the forest was cleared and large changes were placed upon the ecosystem in total. Today rapid urban and recreational growth, agricultural reclamation of marginal land, resource extraction and the many activities of the urban shadow continue to alter the landscape. Fewer and fewer areas retain their original character; the diversity of biotic species and ecological communities has been reduced.

We are now learning that the ecosystem in which we live must be healthy in order to support a good quality of life. Some of the functions of the ecosystem include: cleaning and recycling wastes; purifying air and water; providing a living library of potentially important food, fibre and medicines; protecting wild gene pools necessary for breeding into existing crops; prevention of erosion; providing a source for plants to heal abused landscapes; and many more (Nature Conservancy 1975).

Given the assumption that urban growth will continue, at least for a few decades, a great deal can be accomplished in protecting natural ecosystems by channelling that growth into less environmentally destructive patterns. To maximize the effectiveness of this approach, we must pay attention to the ecological/environmental particulars of different kinds of landscapes. We need to protect from destruction

an adequate array of ecosystems, biological communities, endangered species habitats and endangered physio-chemical environmental features. If this is not done species after species, community type after community type, ecological component after ecological component may disappear.

The Hamilton-Wentworth Region is in the process of developing an Official Policies Plan that will outline the future policies and approaches to land use in the Region. The four Conservation Authorities undertook this study in order to support the environmental component in this plan by identifying clearly the significant natural features of the Region.

THE STUDY APPROACH

The sequence of steps in the analysis employed by Ecologistics Limited is presented as Figure 1. A general description of the activities in each of the eight steps is as follows:

1. Establish Selection Criteria

In order to implement the rationale for the sensitive areas study, general criteria for the designation of environmentally sensitive features were formulated. These general criteria were based on the experience of the individuals involved in the study with previous similar studies (Regional Municipality of Waterloo, Regional Municipality of Ottawa-Carleton). Criteria employed in those studies were revised considerably for this project. Further, in order to implement the general criteria, they were made specific to the Hamilton-Wentworth environment during the course of the work.

2. Inventories of the Regional Environment

(a) Physical Environment - mapping of regional geology, soils, landform and groundwater was compiled in order to provide a basis for studying the characteristics of sensitive areas.

(b) Biological Environment - a compilation of records of birds, fish, mammals, reptiles, amphibians and plants was undertaken so as to establish regional occurrences and population levels.

In both of these cases, much information was already available on the Hamilton-Wentworth area and a preliminary identification of environmentally sensitive areas had been made. The material was, however, fragmented and incomplete.

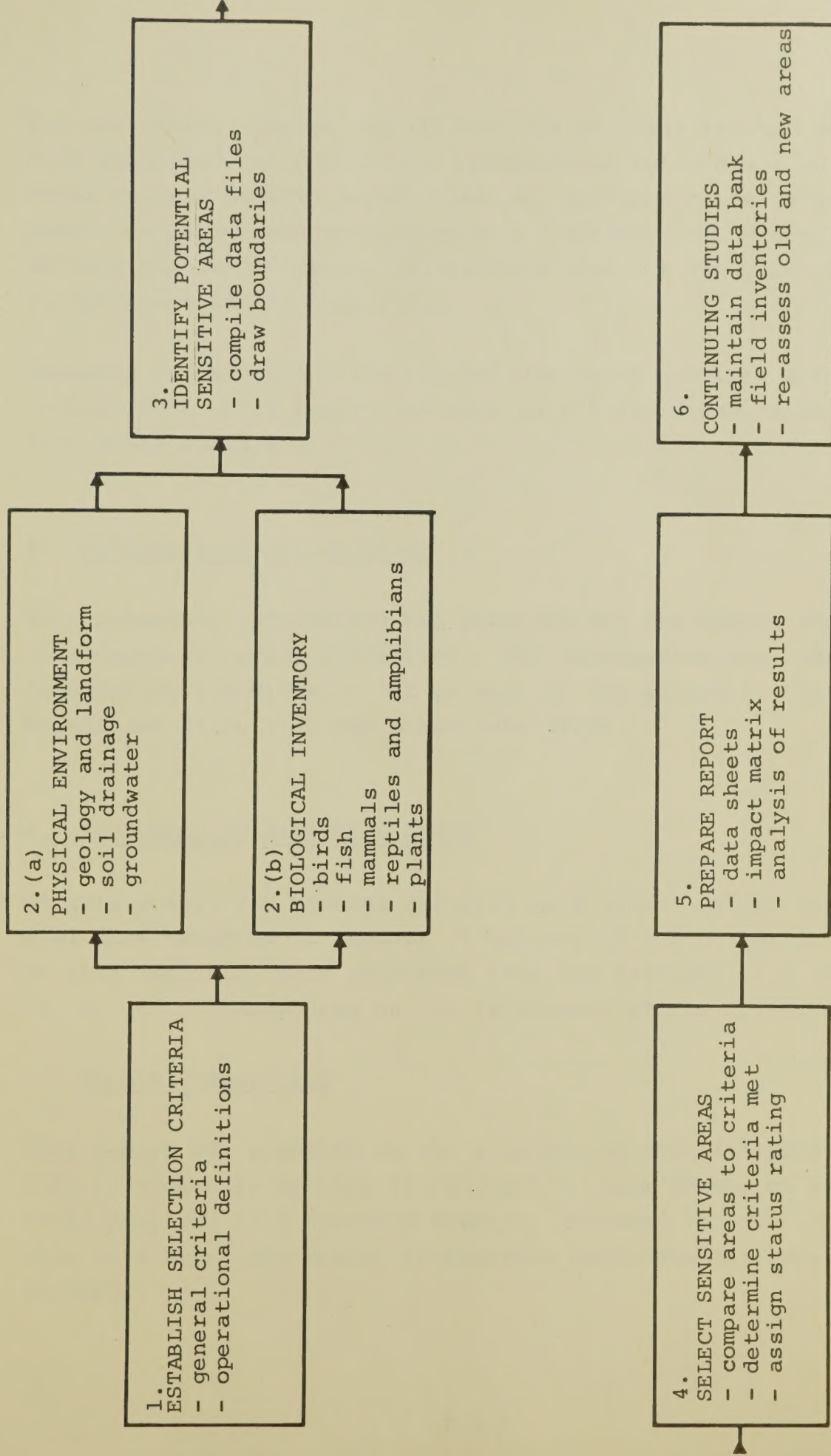


FIGURE 1

The consultant updated and revised the material through interviews with qualified and regionally knowledgeable individuals at the Royal Ontario Museum, Royal Botanical Gardens, conservation authorities, Niagara Escarpment Commission, Ministry of Natural Resources, universities and Hamilton Naturalists Club. A full list of contacts is contained in the Appendices.

Seasonal and budgetary limitations precluded complete on-site inventories. This report was seen as a first phase, distinct from field surveys.

3. Potential Sensitive Areas

This inventory information was prepared for the Region and potential sensitive areas identified. The information was, then, compiled in individual files on each of the potential areas. Boundaries delimiting the areas were drawn.

4. Selection of Sensitive Areas

At this point, the general criteria were firmed up and each potential area rated as to whether it met any of the criteria. Based on this analysis, each potential area was assigned to a class - "A, B, or C" - depending on its fulfilment of the criteria.

5. Report Preparation

This report was prepared on the strength of that analysis. Notably, this introductory section is followed by data sheets on each of the areas prepared in a standard format. Included in each area description is a brief discussion of possible environmental impacts on the features.

6. Continuing Studies

It is intended that the concepts and data bank created during this study will be maintained by the four conservation authorities. This is a necessary function since environmental characteristics change over time and since our knowledge of the Hamilton environment will increase.

Further to this introduction to the approach, the following paragraphs present details of the criteria and selection methods employed.

SELECTION CRITERIA FOR SENSITIVE AREAS

Sensitive areas are those natural landscapes including those lands and/or waters of inherent biological sensitivity, such as those areas containing aquifer recharges, headwaters, unusual plants, wildlife or landforms, breeding or overwintering habitats, vital ecological functions, rare or endangered species, or other combinations of habitat and landform which could be valuable for scientific research or conservation education. These sensitive areas may or may not have been significantly affected by current or past human activity and they may or may not require intensive management in order to restore, maintain or improve certain of their natural values, and they are essentially remnant areas which have not been converted to intensive urban or agricultural uses.

Criteria for selecting these highly sensitive areas for designation in Regional Official Plans and local zoning bylaws include, but are not necessarily restricted to any one or combination of the following.

1. The area represents a distinctive and unusual landform within the municipality, Ontario or Canada.
2. The area serves a vital ecological function such as maintaining the hydrologic balance over a widespread area, i.e. it serves as a water storage or recharge area.
3. The plant and/or animal communities of the area are identified as unusual or of high quality locally within the municipality, Ontario or Canada.
4. The area is an unusual habitat with limited representation in the municipality, Ontario or Canada, or a small remnant of particular habitats which have virtually disappeared within the municipality.
5. The area has an unusually high diversity of biological communities and associated plants and animals due to a variety of geomorphological features, soils, water, sunlight and associated vegetation and microclimatic effects.
6. The area provides habitat for rare or endangered species that are endangered Regionally, Provincially or Nationally.
7. The area is large and undisturbed, potentially affording a sheltered habitat for species which are intolerant to human disturbance.
8. The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.
9. The combination of landforms and habitats is identified as having high aesthetic value in the context of the surrounding landscape and any alteration would significantly lower its amenity value.

IDENTIFICATION AND DELIMITATION OF SENSITIVE AREAS

The basis for the designation of the sensitive areas in the Hamilton-Wentworth Region was an inventory of the natural features of the regional environment. This included several components:

- physiographic mapping - identification and description of physical features, utilizing available reports, maps and air photos.

- soil drainage and water table - identification of areas of high water table and poor internal soil drainage.
- hydrogeology - study of well-log records to identify major recharge and infiltration zones.
- surface water quality - examination of water quality records in order to identify high quality streams and rivers.
- biological surveys - compilation of records on birds, reptiles, amphibians, mammals, fish and plants.

This information was evaluated within the context of the nine selection criteria given above. Landscape units were identified on the basis of the information and, then, evaluated for status according to their fulfilment of the criteria.

Each criterion was looked at individually with a Region-wide perspective so that the Regional level of resolution could be maintained. The final judgements on the fulfilment of a particular criterion were made by the study team as a whole with particular weight given to the professional opinion of the expert in the particular field to which the criterion pertained. A summary of the important operational interpretations of each criterion is given below:

- The distinctive and unusual landforms in the Hamilton-Wentworth Region were defined by the published and verbal comments of several authorities in the field of Earth Sciences.
- Detailed analyses of soil structure, depth and type as well as bedrock structure, well-log information and published ground-water information allowed the hydrologist to delineate the importance of a particular area with respect to its hydrologic functions. Other functions such as biological linkage were considered.
- The existing knowledge of the past conditions of various habitats along with the current review of knowledge of habitat distribution in the Region allowed decisions to be made concerning the diversity and amount of each habitat.

- A high diversity of biological communities in an area was determined using aerial photography and the published information available. Records of a high diversity of flora and fauna from many types of community were used to indicate a high community diversity. An area with high diversity would be one with many ecosystems present (aquatic, marsh, lowland, upland) or a wide range of species within one ecosystem type.
- Any species of breeding bird or mammal that occurred in 10 stations or less was deemed to be rare in the Region. A lesser figure of 5 stations was used to indicate rarity for herptiles because it was felt that the scarcity of field work done on this group might tend to magnify rarity. The rarity of butterflies was determined by the several experts familiar with the Region and mention was made of species found at 5 stations or less. Fish rarity was determined according to the knowledge of several experts in the field. Since no Regional Flora has been done, floristic rarity was determined by consideration of the status of each species in the adjacent counties and published works on provincial rarity.
- Areas larger than 1,000 acres with a high proportion of undisturbed natural landscape fulfilled the large and undisturbed category.
- Significant natural resources combined with facilities and ready access for educational uses were needed in an area before it was deemed suitable for educational purposes. Any area could be used for scientific research but certain areas have been used in the past and mention was made of this fact.
- High esthetic value usually related to: high topographic variability; natural communities forming a backdrop or skyline with an urban context; and individual site components such as waterfalls, high vantage points and cliffs.

Each of the potential units was given a name and a number, and detailed information was researched so that the overall picture of the sensitive area could be ascertained.

Each area was assigned a category dependent upon the number of criteria that it fulfilled. Areas were assigned an A status if they fulfilled 4 or more of the 9 criteria. One area was given an A status even though it fulfilled only 2 criteria. In this situation the natural communities were important as the last remnant of a once common habitat in that area. Areas were assigned a B status if they fulfilled 1 to 3 criteria. Areas were given C status if

they appeared to fulfill the definition for an environmentally sensitive area, but substantial data was lacking. A few areas were given C status, even though they fulfilled 1 criterion, because either the supporting data was not substantiated or it was felt that more information was needed in order to make a proper decision. The C is a holding category until appropriate data is collected which will result in the area becoming an A or B or being removed from Regional consideration. These areas require further investigation.

Each Environmentally Sensitive Area is outlined at a scale of 1:25,000 on individual maps. The boundaries shown outline the area that contains the characteristics for which the designation was made. No buffer zones were included as it is necessary to design a buffer zone with the activity in mind which could cause the disturbance. The size of a buffer zone could vary considerably depending upon the type of activity that is to take place. Thus, the boundaries are to be interpreted only in the sense that they contain the features in question. Activities outside the boundaries could affect features inside. Also, there may be considerable variation in the distribution of features within the lines.

It is essential that detailed studies be carried out in the field, by qualified professionals at the time that individual land-use decisions are made so that these questions may be properly resolved.

It must be recognized that the selection criteria stipulate the Region to be the level of resolution to which this study is applied. Therefore, the Environmentally Sensitive Areas mentioned here are those of Regional importance. Local municipalities may wish to designate other areas which in their opinion are environmentally sensitive. This report has attempted to define those areas which are currently thought to be regionally, provincially or nationally important.

The criteria stipulate that rare species be defined on the Regional level. Appendices 1 through 5 summarize the status of the birds, reptiles, amphibians, mammals, fish and plants in the Hamilton-Wentworth Region. This information gives known population levels of the various species mentioned, and allows the decision-maker to place any particular record or sighting of a species into a Regional perspective. More detailed data concerning a rare species in particular areas is found in the individual sensitive area reports.

The biggest information gap found during the research of this study concerns the flora of the Hamilton-Wentworth Region. No comprehensive Regional Flora has been done to the present time and the need for such a work is considerable.

THE HAMILTON-WENTWORTH ENVIRONMENT

The following subsections constitute a summary and discussion of the general findings of the study with respect to the Regional environment.

Surficial Geology and Landforms

Map 1, accompanying the report, depicts the surficial geology and landforms of the Region. The study area is one of both glacial and lacustrine deposition, containing most types of glaciofluvial, glacio-lacustrine and glacial deposits and landforms.

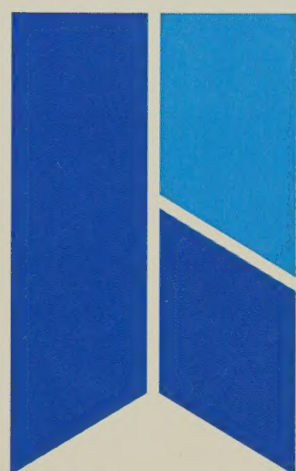
The oldest till in the area is the Wentworth Till of late Wisconsin age. The ice advance which deposited the Wentworth Till also formed the Galt Moraine. The recession of this ice formed the Moffat Moraine, during a brief halt. Also during this recession period, Lake Whittlesey existed and various kame and outwash features were formed. A possible shoreline of Lake Whittlesey is found in Beverly Township (Karrow, 1963).

A further ice advance deposited the Halton Till and Waterdown Moraine. Glacial Lake Warren, formed during the recession of this ice, left shorelines, wave-cut drumlins and gravel bars which are a visible feature in the landscape of Beverly Township. The Halton Till is also exposed below the escarpment as the Vinemount Moraine in the vicinity of Stoney Creek and Grimsby. This feature parallels the Niagara Falls and Fort Erie Moraines further south. These latter two moraines are generally covered by the lacustrine deposits of Lake Warren.

A further glacial lake - Lake Iroquois - later influenced the area. It was relatively long-lived, as is evidenced by its strongly developed beaches. The Lake Iroquois shoreline is formed along the base of the Escarpment, as a bluff composed of Halton Till, and as a thin bay-

Placeholder for Foldout.

Insert to Be Photographed at
a Later Date.



Hamilton
Public
Library

To View This Foldout
Material in Person, Please
Contact Hamilton Public
Library <http://www.hpl.ca>

mouth bar across the Redhill re-entrant. The most notable feature of the Iroquois shoreline is the pair of large gravel bars that originally formed a lagoon at the site of the present Hamilton harbour.

Based on this sequence of glacial action, the Region can be divided into several physiographic units, as follows:

- Above the Niagara Escarpment

- 1.- The Galt moraine, drumlin, esker, kame and outwash deposit complex occurring in Flamborough Township. The drumlins possess wave-cut terraces and gravel spits. Most of the drumlins are cultivated, but near the northern boundary of the Region they become increasingly bouldery. Deposits between the drumlins are often shallow and stony. The Moraine is quite stony, with a rough hummocky topography.
- The waterdown and Vineland Moraines ringing the top of the Escarpment.
- 2.- An extensive clay plain (Haldimand Clay Plain) covers most of the Township of Glanbrook and part of the towns of Ancaster and Stoney Creek. The Plain was deposited by Lake Warren; the lacustrine clays can be shallow.
- 3.- The Flamborough Plain, an area of shallow depth to bedrock occupies part of Flamborough Township. Thin lacustrine deposits cover the southern part of the Plain. In the north, sands and silts occur. These deposits merge with the outwash sands and gravels of the drumlinized area to the north.

- Below the Niagara Escarpment

The land below the Escarpment has characteristics not found in the upland part of the Region. It is floored by soft, reddish shales and sandstones. Ravines have been cut into this material, and sometimes extend back, in the form of notches, into the Escarpment. The Dundas Valley is the largest and deepest of such notches or re-entrants.

- 1.- The gently sloping area which extends from Lake Ontario to to an elevation of about 350 feet was once covered by glacial Lake Iroquois and is called the Iroquois Plain. It consists of weathered red shale overlain by lenses of clay till and lacustrine sand.

- 2.- The bench between the Lake Iroquois shoreline and the Escarpment is rolling and dissected by ravines. In the Dundas Valley, this bench has been cut by ravines to form a number of steep-sided serpentine ridges.

- The Niagara Escarpment

The outstanding physiographic feature of the Region is the Niagara Escarpment which traverses the whole area. The Queenston formation of red shale, with occasional greenish siltstone bands, forms the base of the Escarpment. The Cataract and Clinton groups of white and gray sandstones, gray shale and buff dolomite rest upon this Queenston formation and are exposed along the Escarpment. The Escarpment is capped by resistant dolomites of the Lockport formation. The Escarpment was produced by differential erosion of these different rocks.

A small scarp - Eramosa Scarp - is found near Stoney Creek south of the Escarpment. It is formed in rock of the Lockport formation and was probably influenced by glacial action.

Areas of High Water Table and High Infiltration

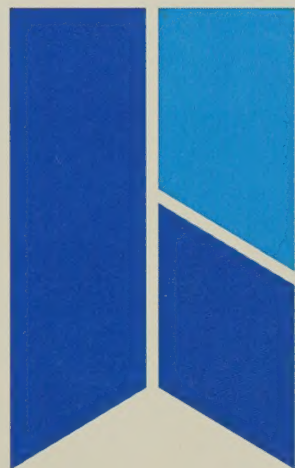
The areas of high water table within the Region are shown on Map 2. This exhibit was developed from the soil survey of Wentworth County and shows the two types of soils in which a high water table was observed:

1. Very Poorly Drained Soils. These are areas of organic soils, such as the Beverly Swamp, where free water remains at or within 12 inches of the surface most of the year (10-11 months). These soils are:

- muck
- marsh

Placeholder for Foldout.

Insert to Be Photographed at
a Later Date.



Hamilton
Public
Library

To View This Foldout
Material in Person, Please
Contact Hamilton Public
Library <http://www.hpl.ca>

2. Poorly Drained Soils. These are areas of poorly drained mineral soils, usually occupying level or depressional areas, in which the water table is within 12 inches of the surface for a large part of the year (9-10 months). These soils are:

- | | |
|------------|------------|
| - Colwood | - Lincoln |
| - Flamboro | - Morley |
| - Granby | - Parkhill |
| - Jeddo | - Toledo |
| - Lily | |

The high infiltration areas shown on Map 2 are those soils that are well drained (soil moisture content seldom exceeding the soil capacity to hold water except immediately after rainfall) and which are developed on materials with a high infiltration rate, such as sands and gravels. The following soils and parent materials exhibit these characteristics:

- | | |
|--------------|---|
| - Burford | - loam over outwash gravel |
| - Donnybrook | - gravel and cobbly gravel (esker) |
| - Dumfries | - gravelly, sandy loam till |
| - Farmington | - less than 12 inches loam over bedrock |
| - Grimsby | - lacustrine medium and fine sand |
| - Springvale | - sand over outwash gravel |
| - Guelph | - loam till |

The above soils have an estimated infiltration rate of 4 to 5 inches per hour. These high infiltration areas can be regarded as major recharge areas. They are major in the sense that other areas have lower rates of recharge or may be areas of discharge. Whether these recharge areas serve the local or regional groundwater systems depends upon the nature of the subsurface conditions.

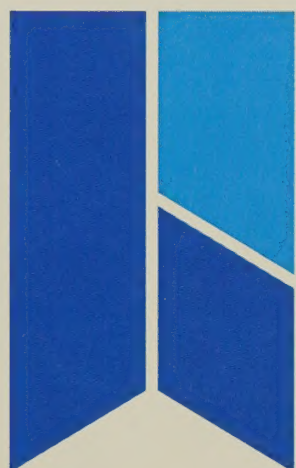
Also shown on Map 2 is the approximate elevation of the piezometric surface (water table) as identified from well log records.

Streams and Sampling Stations

The streams and various sampling stations in the Hamilton-Wentworth Region are shown on Map 3. Both water quality and fish sampling

Placeholder for Foldout.

Insert to Be Photographed at
a Later Date.



**Hamilton
Public
Library**

To View This Foldout
Material in Person, Please
Contact Hamilton Public
Library **<http://www.hpl.ca>**

stations are shown. Some of the Department of Lands and Forests (now the Ministry of Natural Resources) sampling stations collected both fish and water quality information. The Ministry of the Environment stations collect water quality data only and the Royal Ontario Museum collections contain fish information only. The stations are numbered according to the original survey numbers. Sometimes one station has been given different numbers at different sampling surveys.

Most of the Region has a warm water flora much of which has been badly degraded by pollution of various forms. The upper reaches of several streams in the northern part of Flamborough Township have cold water biota.

This information was used in defining and evaluating the environmentally sensitive areas of the Region.

Biological Communities

The Hamilton Wentworth Region rests on the boundary between the Carolinian and Great Lakes - St. Lawrence life zones.

The Carolinian life zone is widespread in the eastern United States but only extends into Canada in southwestern Ontario between lakes Huron, Erie and Ontario. The common deciduous trees are Sugar Maple, Beech, White Elm, Basswood, Red Ash, White Oak and Butternut. But the area is particularly known for the southern plants that are largely confined to the life zone. Some of the trees include: Tulip-tree, Cucumber-tree, Pawpaw, Red Mulberry, Kentucky Coffee-tree, Redbud, Black Gum, Blue Ash, Sassafras, Pignut Hickory, Black Oak, Pin Oak, Black Walnut, Sycamore and Swamp White Oak. Many species of herbaceous plants are also confined to this life zone.

The Great Lakes-St. Lawrence life zone extends from the Gaspé to eastern Manitoba. It has a forest of mixed composition that is characterized by Eastern White Pine, Red Pine, Eastern Hemlock and Yellow Birch. Other common trees include: Sugar Maple, Red Maple, Red Oak, Basswood, White Elm, Eastern White Cedar, Large-tooth Aspen, Beech, White Oak, Butternut and White Ash. Boreal species such as White Spruce, Black Spruce, Balsam Fir, Jack Pine, Poplars, and White Birch and intermixed with the other trees (Hosie, 1969).

This blending of the two life zones in the Hamilton-Wentworth Region produces a high diversity of biological communities. Many of the Carolinian species are approaching the north end of their range for Canada in the Region.

Many species of flora and fauna are rare in the Region and their continued existence may be jeopardized by future development.

Tables 1 through 5, on the following pages, summarize the results of our studies with respect to the distribution and rarity of species within the Hamilton-Wentworth Region.

Each of the species listed in the tables are rare in the Hamilton-Wentworth Region. All are native species, with the exception of a few fish. Some are on the edge of their natural ranges and, therefore, are rare because of environmental factors such as climate. Some are rare because suitable habitat has decreased in frequency of occurrence. Others are rare for unknown reasons but habitat loss, general environmental pollution and excessive market hunting in the last century are suspected causes.

Table 5 lists only those plants that are rare in the Hamilton-Wentworth Region and are also Provincially rare. Many other species of plants are rare in the Region but are not listed here.

Each of these species have specific habitat requirements that are now being fulfilled by the communities in which they breed or live all year long. We often know very little about the detailed requirements of each of these species but conservative management would suggest that habitat disturbance be kept to an absolute minimum. The communities that support the rare species also contain a broad range of more common species.

These lists are the key element in our judgement of the sensitive areas.

While some of these species may be common in other jurisdictions, our search shows them to be of very limited distribution in the Hamilton-Wentworth Region. As such, they are deserving of protection.

TABLE 1

RARE MAMMALS, HAMILTON-WENTWORTH REGION

- | | |
|---------------------|----------------------------|
| - Virginia Opossum | - Northern Flying Squirrel |
| - Smokey Shrew | - Southern Flying Squirrel |
| - Water Shrew | - Deer Mouse |
| - Least Shrew | - Woodland Vole |
| - Hairy-tailed Mole | - Woodland Jumping Mouse |
| - Silver-haired Bat | - Porcupine |
| - Hoary Bat | - Bobcat |
| - Snowshoe Hare | - Beaver |

TABLE 2

RARE FISH, HAMILTON-WENTWORTH REGION

- | | |
|-----------------------|--------------------------|
| - Bowfin | - Banded Killifish |
| - Gizzard Shad | - Brook Silverside |
| - Rainbow Trout | - Tree-spine Stickleback |
| - Brown Trout | - Trout-Perch |
| - Grass Pickerel | - Bluegill |
| - Goldfish | - Smallmouth Bass |
| - River Chub | - Black Crappie |
| - Golden Shiner | - Yellow Perch |
| - Blacknose Shiner | - Rainbow Darter |
| - Spottail Shiner | - Logperch |
| - Spotfin Shiner | - Mottled Sculpin |
| - Northern Hog Sucker | - Slimy Sculpin |
| - Tadpole Madtom | |

TABLE 3

RARE BREEDING BIRDS, HAMILTON-WENTWORTH REGION

- | | |
|-----------------------------|--------------------------------|
| - Pied-billed Grebe | - Winter Wren |
| - Great Blue Heron | - Carolina Wren |
| - Black-crowned Night Heron | - Long-billed Marsh Wren |
| - Least Bittern | - Short-billed Marsh Wren |
| - American Bittern | - Veery |
| - Gadwall | - Eastern Bluebird |
| - Green-winged Teal | - Blue-gray Gnatcatcher |
| - Northern Shoveler | - Loggerhead Shrike |
| - Hooded Merganser | - Yellow-throated Vireo |
| - Cooper's Hawk | - Philadelphia Vireo |
| - Red-shouldered Hawk | - Golden-winged Warbler |
| - Marsh Hawk | - Blue-winged Warbler |
| - Virginia Rail | - Black-throated Green Warbler |
| - Common Gallinule | - Cerulean Warbler |
| - American Coot | - Chestnut-sided Warbler |
| - Upland Sandpiper | - Pine Warbler |
| - Common Tern | - Northern Waterthrush |
| - Long-eared Owl | - Louisiana Waterthrush |
| - Saw-whet Owl | - Mourning Warbler |
| - Whip-poor-will | - Yellow-breasted Chat |
| - Red-headed Woodpecker | - Canada Warbler |
| - Yellow-bellied Sapsucker | - Orchard Oriole |
| - Alder Flycatcher | - Grasshopper Sparrow |
| - Least Flycatcher | - Henslow's Sparrow |
| - Cliff Swallow | - Clay-coloured Sparrow |
| - Tufted Titmouse | - Swamp Sparrow |
| - Brown Creeper | |

TABLE 4

RARE REPTILES AND AMPHIBIANS, HAMILTON-WENTWORTH REGION

- | | |
|-------------------------------------|-----------------------------------|
| - Mudpuppy | - Northern Water Snake |
| - Four-toed Salamander | - Brown Snake |
| - Bullfrog | - Red-bellied Snake |
| - Mink Frog | - Butler's Garter Snake |
| - Pickerel Frog | - Northern Ribbon Snake |
| - Musk Turtle | - Northern Ringneck Snake |
| - Spotted Turtle | - Eastern Smooth Green Snake |
| - Wood Turtle | - Black Rat Snake |
| - Blanding's Turtle | - Eastern Fox Snake |
| - Map Turtle | - Eastern Massassauga Rattlesnake |
| - Eastern Spiny
Softshell Turtle | - Timber Rattlesnake |

TABLE 5

RARE PLANTS, HAMILTON-WENTWORTH REGION^{1,2}

TREES

- Sweet Chestnut
- Red Mulberry
- Sassafras
- Flowering Dogwood
- Tulip Tree
- Black Walnut
- Swamp White Oak
- Tupelo

PLANTS (non-flowering)

- Purple Cliff Brake

PLANTS (flowering)

- Green Violet
- Tall Bellflower
- Perfoliate Bellwort
- Wild Yam
- Wild Aster (A. *prenanthoides*)
- Yellow Mandarin
- Robin-Plantain
- Showy Tick-Trefoil

1. These plants occur within the Region and are noted on the preliminary list of rare plants for Ontario.
2. This listing is less complete than others in this report.

THE HAMILTON-WENTWORTH ENVIRONMENTALLY SENSITIVE AREAS

Based on this process of analysis some forty-four environmentally sensitive areas are noted by this study. Forty-three of them are wholly or partly within the Hamilton-Wentworth Region. One area is within the Hamilton Region Conservation Authority, but outside the Region. These forty-four areas are shown on Maps 4 and 5 summarized in Table 6. The detailed descriptions of the areas are presented in a following section.

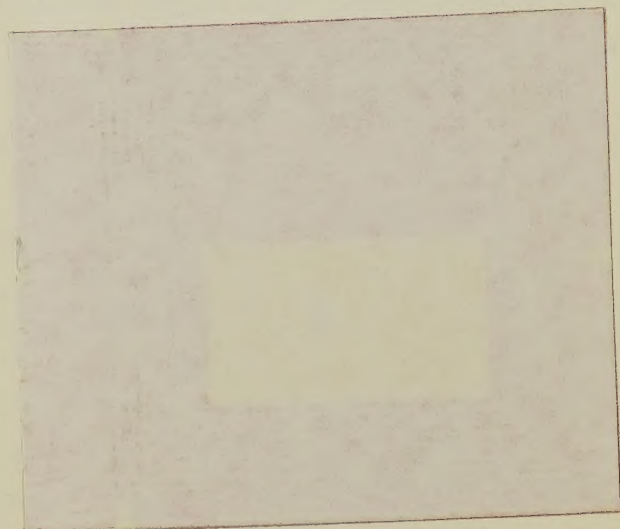
In total, they represent some 31,254 acres and 11.0% of the Regional land area. This is a relatively large land area, but the environmental features of the Hamilton-Wentworth Region are significant and large in size. Areas such as the Beverly Swamp, Dundas Valley, Niagara Escarpment and Royal Botanical Gardens occupy many acres and are well-known.

The following table summarizes the status of the areas noted:

<u>Status</u>	<u>Number</u>	<u>Acres</u>	<u>Percent Land Area</u>
A	15	20,565	7.3%
B	23	9,131	3.2%
C	5	1,220	.5%

In terms of criteria fulfilled, the criterion with the least area involved is number one related to unusual landforms. The criterion met by the largest land area is number six, providing habitat for rare species (see Table 6).

The Hamilton-Wentworth Environmentally Sensitive Areas represents the last remnants of the natural communities which once covered the Region. All of the major landform and biological community types found in the Region are represented in these areas. Many of the types are, however, significantly reduced from their pre-settlement extent. Nevertheless, much remains that is valuable and important.



Placeholder for Foldout.

Insert to Be Photographed at
a Later Date.

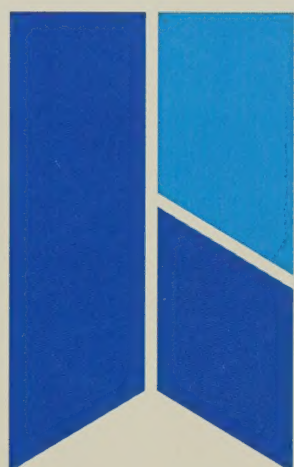


**Hamilton
Public
Library**

To View This Foldout
Material in Person, Please
Contact Hamilton Public
Library **<http://www.hpl.ca>**

Placeholder for Foldout.

Insert to Be Photographed at
a Later Date.



**Hamilton
Public
Library**

To View This Foldout
Material in Person, Please
Contact Hamilton Public
Library **<http://www.hpl.ca>**

The Hamilton-Wentworth Region has a liberal distribution of Environmentally Sensitive Areas. The dominant landforms and resultant land-use patterns have dictated that most of the remaining natural communities are related to the Niagara Escarpment and the limestone-drumlin-moraine topography in the north of Flamborough Township. The escarpment insures that many of the areas are linked together to form a mosaic of green which often extends through heavily urbanized areas.

There are 8 areas over 1,000 acres in size. This is remarkable considering the intensive agricultural and urbanization pressures in the Hamilton-Wentworth Region. Most of the sensitive areas are in private ownership.

Wetlands are heavily represented in the sensitive areas but in total, every major ecological community now recognized in the Hamilton-Wentworth Region is represented in the total ESA package. Therefore, protection for the ESA's ensures that the natural diversity that has developed over many thousands of years will be passed into the future.

TABLE 6

ENVIRONMENTALLY SENSITIVE AREAS

NO.	NAME	ACRE- AGE	CRITERIA							STATUS*
			1	2	3	4	5	6	7	
1	Beverly Swamp	4,850		x	x	x	x	x	x	x
2	Valens Conservation Area	578				x		x		x
3	Fletcher Creek Swamp Forest (Crieff Bog)	1,697		x	x	x	x	x		A (Hm)
4	Crieff Old Field Complex	338			x			x		B (Hm)
5	Beverly Sparrow Field, Hyde Tract & Rockton Tract	1,255			x		x	x	x	A (Gr)
6	Rockton Wetland	341						x		B (Gr)
7	Westover Wetland	860						x		B (Gr, Hm)
8	Westover Drumlin Field	647	x			x				B (Hm)
9	Forestry & Wildlife Area	1,083		x		x		x		B (Hm)
10	Hayesland Forestry Wildlife Area	1,517		x				x	x	B (Hl, Hm)
11	Millgrove Woodlot	189						x		B (Hm)
12	Donald Farm Wetland	223				x				B (Hm)
13	Christie Conservation Area	792			x			x	x	B (Hm)
14	Spencer Gorge (Webster's & Tew's Falls)	290	x		x		x	x	x	A (Hm)
15	Borer's Falls - Rock Chapel	600	x				x	x	x	A (Hm)
16	Royal Botanical Gardens - Cootes Paradise	1,840			x	x	x	x	x	A (Hl, Hm)
17	Langford Forest	100								C (Gr)

TABLE 6

ENVIRONMENTALLY SENSITIVE AREAS

NO.	NAME	ACRE- AGE	CRITERIA FULFILLED									STATUS*	
			1	2	3	4	5	6	7	8	9		
18	Southwest Summit Wetland	225											C (Gr)
19	Copetown Bog	95	x	x	x	x		x		x			A (Hm)
20	Dundas Valley	6,000	x	x	x	x	x	x		x			A (Hm)
21	Tiffany Falls	220	x			x		x					B (Hm)
22	Hamilton Mountain (Radial Line)	365	x		x		x	x					A (Hm)
23	Ancaster Creek Headwaters	143						x					B (Hm)
24	Hamilton Niagara Escarpment	490	x					x				x	B (Hm)
25	Redhill Creek - King's Forest	1,264	x	x	x		x	x				x	A (Hm)
26	Felker's Falls & Niagara Escarpment	182	x	x				x				x	A (Hm)
27	Niagara Escarpment - Devil's Punch Bowl East	950	x	x	x			x		x		x	A (Hm)
28	Hydro Islands	0						x					B (Hm)
29	Toll Gate Ponds	70					x	x					B (Hm)
30	Redhill Creek Marsh - Van Wagner's Marsh	72					x	x					A (Hm)
31	Stoney Creek Ponds	90					x	x					B (Hm)
32	Saltfleet Woodlot	336		x				x					B (Hm,Ng)
33	Tweedside Forest	18			x			x					B (Ng)
34	Woodburn Floodplain	68						x					B (Ng)
35	Twenty Mile Creek Floodplain Forest & Meadows	205											C (Ng)
36	Hannon Floodplain Forests	208									x		C (Ng)

TABLE 6

ENVIRONMENTALLY SENSITIVE AREAS

NO.	NAME	ACRE- AGE	CRITERIA							STATUS*
			1	2	3	4	5	6	7	
37	Sinclairville Lowland Forests	646						x		B (Ng)
38	Hamilton Golf & Country Club	326						x		B (Hm)
39	Jerseyville Road Woodlot	424								C (Gr)
40	Tyneside Woodlot	58						x		C (Ng)
41	Mountsberg Wildlife Area	856			x	x		x		A (Hl)
42	Bronte Creek Ravine	249		x	x		x	x		A (Hl)
43	Carlisle Swamp	317		x				x		B (Hl)
44	Lake Medad	420						x		B (Hl)
TOTAL		31,254								

FULLILLS CRITERION	
1.-	11,103
2.-	18,540
3.-	20,859
4.-	18,321
5.-	18,410
6.-	29,673
7.-	15,426
8.-	15,901
9.-	16,464

* A,B,C - defined in text

- Gr - Grand River Conservation Authority
- Hl - Halton Region Conservation Authority
- Hm - Hamilton Region Conservation Authority
- Ng - Niagara Peninsula Conservation Authority

DATA SHEETS AND DATA BANK

Each Environmentally Sensitive Area has been presented using a standardized report form. Each report lists the area name, the applicable Conservation Authority(s), the category of sensitivity, the ownership, the size and the location. Detailed land title searches were not made. Size was measured on 1:25,000 topographic maps using a polar planimeter.

The disturbance factor matrix attempts to indicate with a very broad brush the types of disturbance factors that could have negative impact on the area in question. Each disturbance factor type is general in nature and specific exceptions are to be expected.

The matrix is intended only to raise red flags for further studies on the impacts of land developments on the sensitive areas.

It is desirable that the current state of knowledge as represented in the document be updated and enlarged in the future. Possible ways of accomplishing this could be:

- To maintain a current file on each area that would contain recent inventories, impact reports, aerial photos, habitat maps, etc.
- To encourage the production of a comprehensive Regional Flora that would contain information on each species of plant including its community affinities and Regional status.
- To encourage amateurs and professionals alike to contribute field data to central Regional file.
- To encourage the publication of the extensive amounts of information collected each year by various public and private bodies.
- To maintain files on the status and occurrence of each species of higher fauna and flora in the Region.

The complete files of the information compiled on each of the sensitive areas are to become the property of the respective conservation authorities. They will maintain and supplement the information.

The information and interpretations contained in the following sections of this report can stand as a summary of the natural history information now available from the Hamilton-Wentworth Region. In the future, additional information and evidence will appear. It is strongly recommended that this information be added to the existing data base and used in the protection of the important natural features of the Region.

LITERATURE CITED

- Anonymous. Soils of Wentworth County. The Research Branch, Canada Department of Agriculture and the Ontario Agricultural College. Report No. 32.
- Arbib, Robert. 1976. The Blue List for 1976. American Birds 29 (6):1067-1072.
- Banfield, A. W. F. 1974. The mammals of Canada. National Museum of Natural Sciences, National Museums of Canada. University of Toronto Press.
- Bastin, Eric W. 1963. Cootes Paradise - A Naturalist's View. RGB, XVII(1):1-6.
- Brown, J. R. 1928. The herpetology of Hamilton, Ontario, and district. Canadian Field Naturalist 42(1):125-127.
- Catling, P. M., J. E. Cruise, K. L. McIntosh and S. M. McKay. 1975. Alvar vegetation in southern Ontario. Ontario Field Biologist 29(2):1-25.
- Campbell, C. A. 1971. An ecological survey for the spotted turtle Clemmys guttata in Huronia. MS, Canadian Wildlife Service of Environment Canada, Ottawa.
- _____. 1975-76. Amphibians and reptiles of the Niagara Escarpment Planning Area. MS, Niagara Escarpment Commission.
- _____. 1973. A survey of the herpetofauna of Bronte Creek Provincial Park. MS, Ministry of Natural Resources, Ontario.
- _____ and A. I. Dagg. 1972. Mammals of Waterloo and south Wellington Counties. Privately printed.
- Chapman, L. J. and D. F. Putnam. 1951. The physiography of southern Ontario. Ontario Research Foundation, University of Toronto Press.
- Clayson, J. C. and R. E. Whiting. 1965. Field observations at Valens: a report of ecological work done in the summer of 1975 for Spencer Creek Conservation Authority.
- Conant, Roger. 1975. A field guide to reptiles and amphibians of eastern and central North America. Second edition. Houghton Mifflin, Boston.

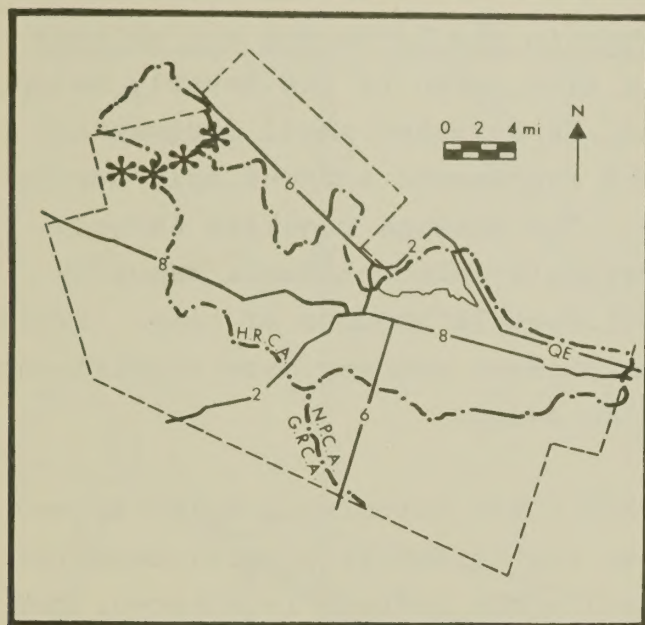
- Dagg, A. I. 1974. Mammals of Ontario. Otter Press, Waterloo, Ontario.
- Department of Energy and Resources Management. 1968. Hamilton Region Conservation Report.
- Department of Commerce and Development. 1960. Spencer Creek Conservation Report.
- Department of Lands and Forests. 1970. Stream Survey of Spencer Creek.
- de Vos, Antoon. 1962. Changes in the distribution of the snowshoe hare in southern Ontario. Canadian Field-Naturalist 76(4):183-189.
- Diamond, Jared M. 1975. The Island Dilemma: Lessons of Modern Biogeographic Studies for the Design of Natural Reserves. Biological Conservation 7:129-143.
- Dillon, M. M., Ltd. 1975. Redhill Creek Watershed Management Study prepared for the Hamilton Region Conservation Authority.
- Dorney, Robert, et al. 1973. Environmental Study. Ecoplans Limited (part of input into McCormick-Rankin study into the widening of the QEW from Highway 403 to 20).
- Dymond, J. R., J. L. Hart and A. L. Pritchard. 1929. The fishes of the Canadian waters of Lake Ontario. Univ. Toronto Stud. Biol. Ser. 33, Publ. Ont. Fish. Res. Lab. 37:1-35.
- Eagles, Paul F. J. 1975. Wooded Ravine, Floodplain and River. American Birds 29(6):1112-1113.
- Fernald, Merritt Lyndon. 1970. Gray's Manual of Botany, Eighth Edition. D. Van Nostrand Company, Toronto.
- Gartshore, Mary. 1974. Trees and vertebrates of Auchinburn Farm (unpublished MS).
- Gilbertson, Michael. 1975. A Great Lakes Tragedy. Nature Canada 4(1):22-25.
- Gleason, Henry A. 1974. The New Britton and Brown illustrated Flora of the Northeastern United States and Adjacent Canada. Hafner Press, New York.
- Godfrey, W. Earl. 1966. The Birds of Canada. National Museums of Canada, Bulletin No. 203, Biological Series No. 73, Ottawa.
- Hamilton Federation of Environmental Groups. 1972. Eco-Inventory Report: An Environmental Appraisal of Halton and Wentworth Counties.

- Hamilton Naturalist Club. 1949-1976. The Wood Duck. This publication of the HNC contains much information on the Hamilton-Wentworth Region's Natural History.
- Hamilton Region Conservation Authority. 1974. Dundas Valley Master Development Plan.
- _____. 1975. Technical report, Mount Albion Conservation Area, resource inventory.
- Hamilton-Wentworth Planning Area Board. 1968. A study of the Ancaster-Dundas Valley system for conservation purposes - Part 1 - A survey of existing conditions.
- Hewitt, D. F. 1971. The Niagara Escarpment. Industrial Mineral Report No. 35. Ontario Department of Mines and Northern Affairs, Toronto, Ontario.
- Hosie, R. C. 1969. Native Trees of Canada. Canadian Forestry Service, Department of Fisheries and Forestry, Seventh Edition, Ottawa.
- Hynes, H. B. N. 1972. The Ecology of Running Waters. Univ. of Toronto Press 555 pp.
- Judd, W. W. 1949. Insects collected in the Dundas Marsh, Hamilton, Ontario, 1946-47, with observations on their periods of emergence. The Canadian Entomologist, Vol. LXXXI(1)1-10.
- _____. 1950. Plants collected in the Dundas Marsh, Hamilton, Ontario 1946. The Canadian Field Naturalist 64(4):127-130.
- _____. 1951. The snapping turtle (Chelydra serpentina L.) in the Dundas Marsh, Hamilton, Ontario. Canadian Field-Naturalist 65:37-39.
- Karrow, P. F. 1963. Pleistocene Geology of the Hamilton-Galt Area. Ontario Department of Mines, Geologic Report No. 16.
- Kay, Ernest R.M. 1949. Limnological Studies of the Dundas Marsh Region. Master of Arts Thesis, McMaster University.
- Klots, Alexander B. 1951. A Field Guide to the Butterflies of North America, East of the Great Plains. Houghton Mifflin Company, Boston.
- Lamoureux, W. J. 1961. Cootes Paradise Sanctuary. RBG, XV(1).
- _____. 1971. Giant Trees of the Gardens. RBG, 25(1):1-6.
- Logier, E. B. S. 1939. The reptiles of Ontario. Handbook No. 4. Royal Ontario Museum of Zoology.

- Logier, E. B. S. and G. C. Toner. 1961. Check list of the amphibians and reptiles of Canada and Alaska. Life Sciences Division, Contribution 53, University of Toronto Press.
- Manning, A. 1975. Borer's Falls Conservation Area resource inventory report (wildlife and vegetation species and location lists). Hamilton Region Conservation Authority.
- Martin, J. E. H. 1950. The reptiles and amphibians of Wentworth County. The Wood Duck 3(9):1-4.
- McIlwraith, Thomas. 1886. The Birds of Ontario. A Lawson and Co., 10 York Street, Hamilton.
- Meiler, Florence. 1963. Cootes Paradise - A Recreational Asset. RBG, XVII(1):7-10.
- Mills, R. C. 1948. A checklist of the reptiles and amphibians of Canada. Herpetologica 4 (second supplement): 2-15.
- Ministry of the Environment. 1970. Guidelines and Criteria for Water Quality Management in Ontario.
- _____. 1970-1971. Water Quality Data for Ontario Lakes and Streams.
- _____. Water Quality Data for 1972, 74 and 75. Computer Printouts.
- Ministry of Natural Resources. Fish stocking records. Cambridge District.
- _____. Sensitive Areas Mapping. Cambridge District.
- _____. 1973. Survey of Spencer Creek. Cambridge District.
- _____. Ministry of Natural Resources. 1975a. Survey of Fairchild Creek. Cambridge District.
- _____. 1975b. Beverly Swamp Conservation Area - Fish and Wildlife Management Program 1976-180. Cambridge District.
- _____. 1975c. Surveys of Lake Ontario Tributaries. Cambridge District.
- Ontario Water Resources Commission. 1968. Water Pollution Survey of the Township of Binbrook, County of Wentworth.
- Peterson, R. L. 1966. The mammals of eastern Canada. Oxford University Press, Toronto.

- Pringle, James S. 1969. Checklist of the Spontaneous Vascular Flora of the Royal Botanical Gardens, Hamilton, Ontario, Canada. Technical Bulletin No. 4, Royal Botanical Gardens, Hamilton.
- _____. 1971. Dr. Pringle's Report on the Radial Line Area. Hamilton-Wentworth Planning Area Board.
- Roseborough, Douglas. 1963. Cootes Paradise - A site for biological research. RBG, XVII(1):10-15.
- Scott, John A. 1970. A Short History of Cootes Paradise. RBG, XXIV(1):1-8.
- Scott, W. B. and E. J. Crossman. 1973. Freshwater Fishes of Canada. Bull. 184, Fish. Res. Board of Canada, 966 pp.
- Schreiber, Mary and Ian MacDonald. 1971. A Preliminary Ecological Survey of Bronte Creek Park Reserve, Town of Burlington and Town of Oakville, Halton County. Ministry of Natural Resources.
- Stewart, D. 1974. Canadian Endangered Species. Gage Publishing 172 pp.
- Straw, A. 1968. Late Pleistocene Glacial Erosion along the Niagara Escarpment in Southern Ontario. Geological Society of America. Bulletin 79:889-910.
- Turner, R. E. 1948. The fish population of the Dundas Marsh, Ontario, senior thesis in Zoology. McMaster Univ. 99pp.
- Warren, A. E. 1950. The fauna of the Royal Botanical Gardens, Hamilton, Ontario. Canadian Field Naturalist 64(4):130-133.
- _____, L. A. Prince and P. F. Henderson. (No date -c. 1952). A survey of the mammalian fauna of Wentworth County, Ontario (unpublished MS).

Section 2: SENSITIVE AREA DATA SHEETS



NAME

Beverly Swamp

CONSERVATION AUTHORITY

Grand River
Hamilton Region
Halton Region

CATEGORY

A

OWNERSHIP

Private and Public
(Hamilton Region Conservation Authority)

SIZE

4,850 acres

LOCATION

The northern part of Flamborough Township from Highway 6 in the east to Waterloo Region in the west.

GENERAL DESCRIPTION

The Beverly Swamp is a very large forested wetland in the northern end of the Hamilton-Wentworth Region. In places the conifer dominated forest is similar in structure to the boreal forest that is found through northern Canada, and several species reach near their southern limit for Canada here, most notably Black Spruce, Snowshoe Hare, Woodland Deer Mouse, Porcupine, Water Shrew and Northern Flying Squirrel. This swamp is part of an unprecedented stretch of unbroken forest that extends from the city limits of Cambridge all the way to the Niagara Escarpment near Milton. An important remnant of this area's once extensive forest.

Only two other swamps reach the magnitude of the Beverly, in Ontario west of Lake Simcoe. They are: the Minesing, near Barrie and the Greenock, near Teeswater.

The Beverly Swamp and the adjacent swamp areas are hemmed in to the north and west by the Galt and Moffat moraines, and to the south and east by an area of Wentworth sandy buff till and its associated West-over drumlins. An area of hummocky kame gravels occurs to the east.

The Galt moraine is a prominent feature in the landscape and extends as a belt of rough hummocky Wentworth till north of the Beverly Swamp. The Moffat moraine, on the other hand, is a rather small fragmentary moraine composed of Wentworth Till and represents a brief halt during the southward retreat of glacial ice. The moraine consists largely of 10 to 50 feet of laterally and vertically discontinuous deposits of sand, gravel, and pebbles with considerable amounts of clay. Small isolated units of sand and gravel are present and may have significance in local groundwater discharge into the swamp.

Fine to medium crystalline dolomite and black bituminous dolomite and shale of the Guelph formation underlie the surficial glacial deposits. The actual character of fracturing within the bedrock is unknown, but water distribution and water production suggests moderate permeability.

In the area adjacent to the Swamp and in the swamp itself bedrock is shallow beneath the surface. The overburden thickness is of course deeper, beneath the Drumlins and moraines (Galt and Moffat).

The Westover drumlins have significance in initially creating the swamp condition by restricting surface water drainage. It appears evident that the formation relates to blocked drainage, rather than to the possibility of a bedrock depression beneath the swamp.

In the times of European settlement the Swamp was looked upon as an area of darkness and evil. Mrs. Wilkins, a long time resident of Freelton, recently commented: "You never got any sunlight in the swamp. Mother wouldn't let any of the children walk home alone from school" (Dejoode, 1975).

Today our perceptions and values are changing. We no longer see woods as evil and objects that must be destroyed. The swamp provides essential habitat for many creatures that occur nowhere else in the Region. It is a treasure of biotic diversity.

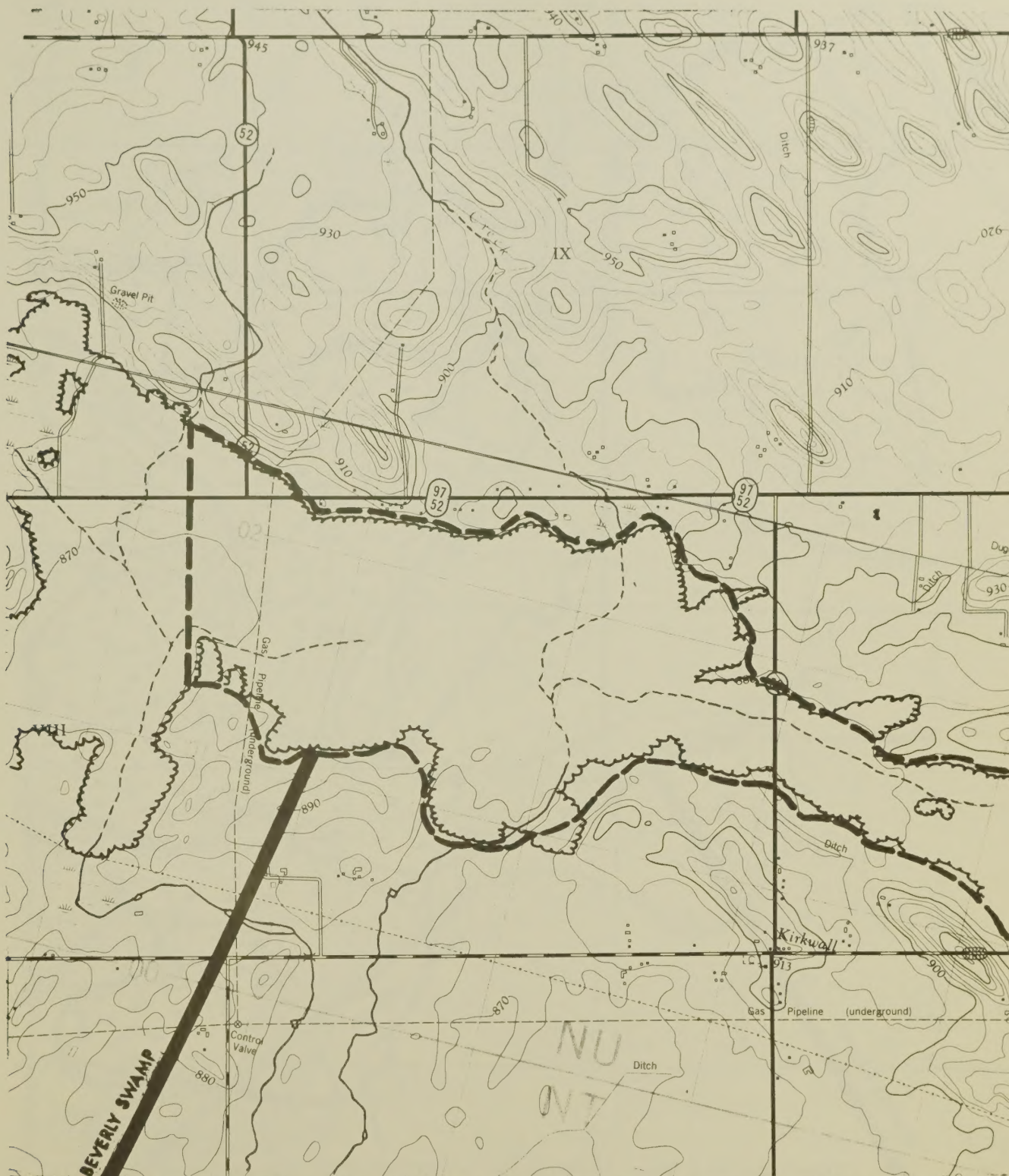
The swamp has significance from a local, Regional and Provincial point-of-view. Since so many species reach their southern limit for Canada here, it may be of National importance.

ecologistics limited

HAMILTON - WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

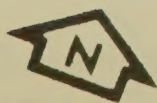
AREA
NO .

1



Topographic Map Reference - ABERFOYLE 40P/8g Edition 1
FREELTON 40P/8h Edition 2
SHEFFIELD 40P/8b Edition 1
WESTOVER 40P/8a Edition 2

Military Grid Reference - 710035 (FREELTON MAP)



SCALE 1 : 25,000
0 1 Mi

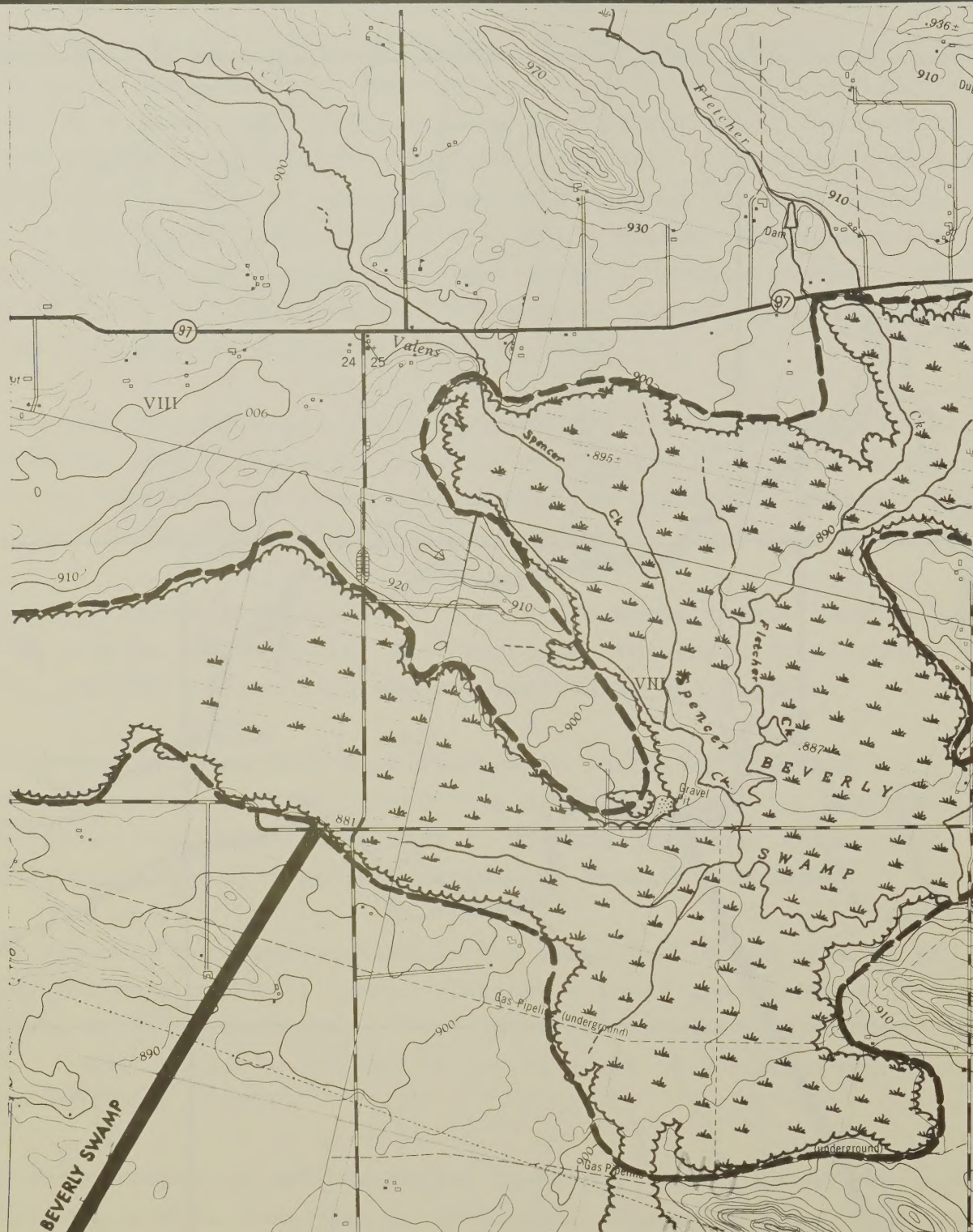
ecologistics limited

1976

HAMILTON — WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

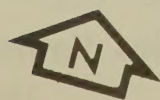
AREA
NO .

1



Topographic Map Reference - ABERFOYLE 40P/8g Edition 1
FREELTON 40P/8h Edition 2
SHEFFIELD 40P/8b Edition 1
WESTOVER 40P/8a Edition 2

Military Grid Reference - 710035 (FREELTON MAP)



SCALE 1 : 25,000

1 Mi

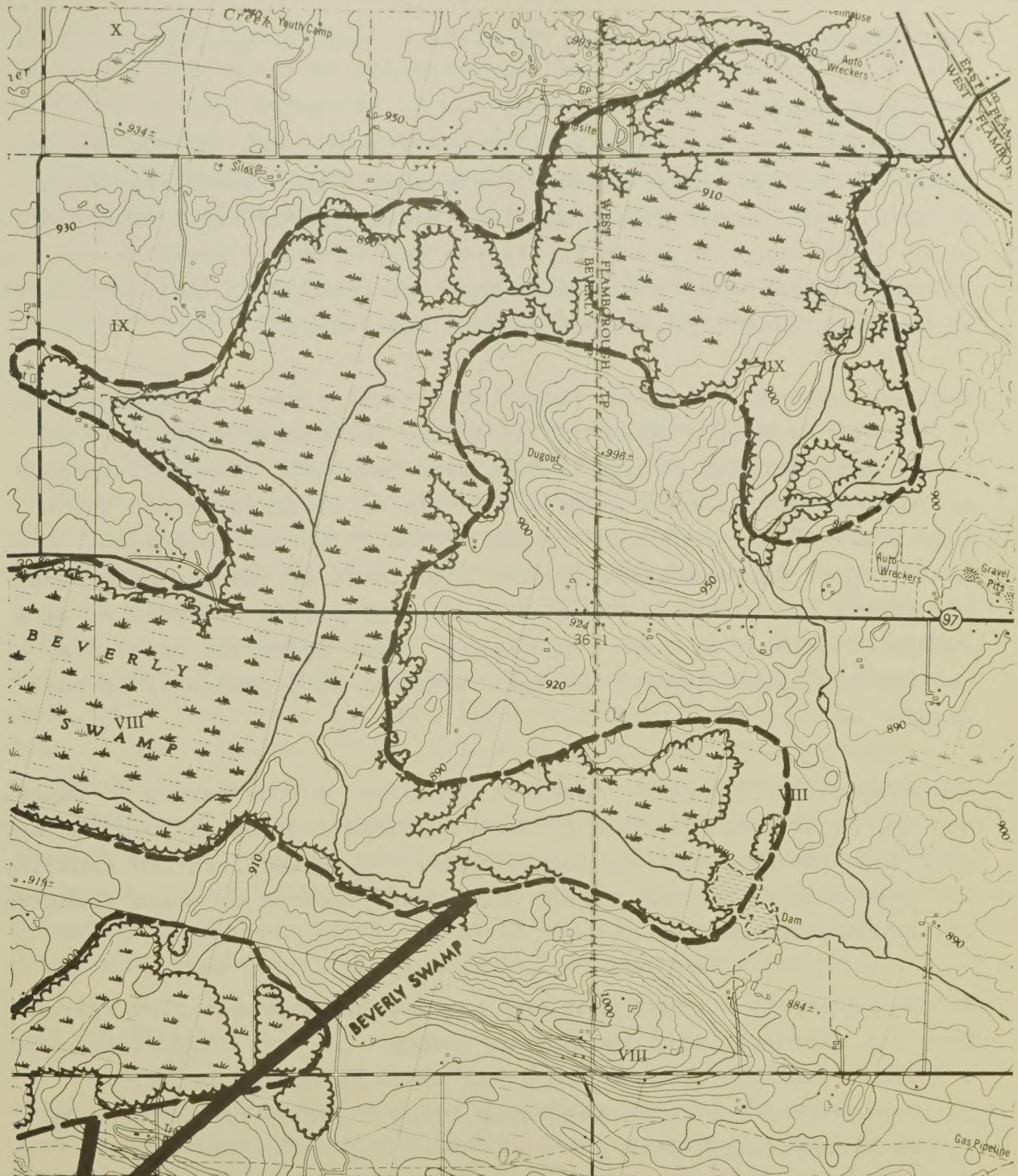
ecologistics limited

1976

HAMILTON — WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

AREA
NO .

1



Topographic Map Reference - ABERFOYLE 40P/8g Edition 1
FREELTON 40P/8h Edition 2
SHEFFIELD 40P/8b Edition 1
WESTOVER 40P/8a Edition 2

Military Grid Reference - 710035 (FREELTON MAP)

SCALE 1 : 25,000

1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 2, 3, 4, 5, 6, 7, 8, and 9

Criterion Two

Beverly Swamp is the headwaters of the Bronte Creek (Halton Region Conservation Authority) which flows eastward then south into Lake Ontario, the Spencer Creek (Hamilton Region Conservation Authority) which flows south to enter Burlington Bay at Cootes Paradise and the Fairchild Creek which flows west then south to join the Grand River at Onondaga (Grand River Conservation Authority).

Regional groundwater moves along the natural slope of the bedrock from north to south. Most drillers find reasonable quantities of fresh water between 20 and 80 feet into bedrock. Piezometric heads averaging about 35 feet above the levels at which water was found indicate the semi-confining nature of the limestone formation. One would expect increased groundwater flow rates at the southern boundary of the Galt moraine where hydraulic gradients are greater as a result of steeper bedrock topography. Lower hydraulic gradients beneath the swamp suggest a slower movement of groundwater in that area.

The hummocky topography, imperfect drainage, porous nature of deposits, and the significant drop in piezometric head from north to south suggest that the Galt moraine has relatively high infiltration capacity. The Galt moraine is most likely the primary source of water recharge to the bedrock aquifer.

Two observations suggest that the regional groundwater flow system does not discharge into the Beverly Swamp.

1. Consistent occurrence of water at depth in nearby wells.
2. Unsaturated surficial sediments lying directly on the bedrock in nearby wells.

On the contrary, the swamp may be acting as another "recharge" area, along with the Galt moraine, providing a continuous source of water for seepage through the overburden into the limestone fractures of the bedrock.

Criteria Three and Four

The swamp is a piece of northern, wetland forest that is far south for a biological community of its type. Only the Minesing and Greenock Swamp, in southwestern Ontario, compare to the Beverly in size and importance. Much of the swamp is relatively undisturbed and the biological communities are of high quality.

The cold water streams in the north end of Flamborough Township are the last habitats of this type and quality in the Region.

Water Quality

Limited water quality data is available for several stations in Beverly Swamp, and more detail is available for the MOE station at Valens (also used by the MNR (1973) station 2), just upstream of the Swamp. The Valens data shows summer maximum temperatures occasionally reaching 24°C, and dissolved oxygen levels occasionally as low as 5 mg/l. However, the Valens tributary is considered warmer and of poorer quality than the main branch of Spencer Creek and Puslinch Creek (MNR, 1975b). The other 4 sites in the Swamp (MNR (1973) station 8 and MNR (1975b) station 3; MNR (1975b) station 2; DLF station 2, MNR (1973) station 7, MNR (1975b) station 4; MNR (1975b) station 5) had low summer temperatures and fairly high dissolved oxygen levels; only one oxygen reading was below the 6.0 mg/l considered necessary in a cold-water stream. That water quality is quite good is shown by the fact that the main tributary of Spencer Creek, north of Highway 97, is considered prime brook trout habitat (D. Howell, personal communication).

Fish Populations

Beverly Swamp has a large number of fish species. As well as those listed below, there are several common species not described: Central Mudminnow, Northern Redbelly Dace, Finescale Dace, Brassy Minnow, Fathead Minnow, Blacknose Dace, Creek Chub, Pearl Dace, White Sucker, and Brook Stickleback.

Brown Trout (Salmo trutta)

(No Sites). Brown Trout were stocked in Beverly Swamp from 1953 to 1958 by the MNR. Apparently they have since disappeared - the MNR last caught one in 1966 (MNR. 1975b). However, according to J. Coates (personal communication), the occasional trout is still caught there.

The Brown Trout is a valuable sport fish, growing in popularity (it was once less favoured because it is difficult to catch and because it often competes with Brook Trout). It spawns in late fall and early winter, and has similar habitat requirements to the Brook Trout. However, the Brown Trout can withstand higher temperatures than the Brook Trout, and is therefore found in the lower reaches of streams that are unsuitable for Brook Trout (Scott and Crossman, 1973).

Brook Trout (Salvelinus fontinalis)

(Dept. of Commerce and Development, 1960, several sites, DLF station 2, MNR (1973) station 8, MNR (1975b) stations 2, 3). Brook Trout were stocked in Beverly Swamp by the MNR from 1967 to 1971 (MNR 1975b), but a natural population did exist there previously. Stocking has been continued for a put-and-take fishery (D. Howell), but a small population also continues to produce itself (D. Howell, J. Coates, pers.comms.).

The Brook Trout is a very popular and highly valued game fish in eastern Canada; it is, to most people, the most valuable fish found in the Hamilton-Wentworth Region. Spawning takes place in late summer and early fall. It inhabits "clear, cool, well-oxygenated streams and lakes" (Scott and Crossman), 1973). It is very sensitive to high temperatures and low oxygen concentrations; in fact the division between cold-water and warm-water streams is primarily based on Brook Trout requirements.

Green Sunfish (Lepomis cyanellus)

(MNR (1973) station 7). The Green Sunfish is found in several places in Spencer Creek, where it is east of its normal Ontario distribution. It is found in a variety of habitats, but usually in the shallows of moderate-sized lakes; Beverly Swamp is also an unusual habitat for the

species. It is quite tolerant of turbidity, more so than other Canadian sunfishes. Spawning takes place in late spring or early summer (Scott and Crossman, 1973).

Mottled Sculpin (Cottus bairdi)

(MNR (1973) station 8). This small sculpin (3 inches) lives in cool streams and lakes, and is often associated with Brook Trout, as it is in Beverly Swamp. It has been suggested that the species could be used as an indicator of waters suitable for Brook Trout, especially in southern Ontario. Brook Trout also eat it, but the Mottled Sculpin's importance as food for Trout is unknown (Scott and Crossman, 1973).

Criterion Five

A study of vegetation on the new Hydro Transmission Corridor found six communities: soft maple swamp, upland hardwood bush, wooded acid bog, cedar swamp, aspen swamp and ponds (Johnson, 1974). Some of the plants which are rare in southern Ontario, are: Naked Mitrewort (Mitella nuda), Black Spruce (Picea mariana) - near the southern edge of its range in North America (except for its occurrence in the Appalachian Mountains), Dwarf Rattlesnake Plantain (Goodyera repens), Virginia Chain Fern (Woodwardia virginica), Stemless Ladies' Slipper (Cypripedium acaule), Showy Ladies' Slipper (Cypripedium reginae), Green Violet (Hybanthus concolor), Loesel's Twayblade (Liparis Loeselii).

Other rare plants, which show the high diversity of biological communities present, are: Leatherwood (Dirca palustris), Bulbet Fern (Cystopteris bulbifera), Goldthread (Coptis groenlandica), Bitternut Hickory (Carya cordiformis), White Wild Licorice (Galium circaezans), Buttonbush (Cephalanthus occidentalis), Three-leaved False Solomon's Seal (Smilacina trifolia), Tufted Loosestrife (Lysimachia thyrsiflora), Indian Tobacco (Lobelia inflata), White Adder's Mouth (Malaxis brachypoda), Smaller Enchanter's Nightshade

(Circaea alpina), One-sided Pyrola (Pyrola secunda), Creeping Snowberry (Gaultheria hispidula), Northern Green Orchis (Habenaria hyperborea) (Johnson, 1974), White Bog-Candle (Habenaria dilatata), Oak Fern (Gymnocarpium Dryopteris) (Shivas, Wood Duck 14(1):11), Round-leaved Sundew (Drosera rotundifolia), Grass Pink Orchid (Calopogon pulchellus), Pitcher Plant (Sarracenia purpurea), and Round-leaved Pyrola (Pyrola asarifolia) (North, Wood Duck 6(1):6).

The animals live in and depend upon the vegetative communities to a large extent. The tremendous numbers of rare and unusual mammals, herptiles and birds represent a highly diverse, undisturbed and important natural biological community.

In 1973, in just a few hours, 26 species of butterflies were found in the Beverly Swamp. These included; Northern Tiger Swallowtail (Papilio glaucus canadensis), Silver-bordered Fritillary (Boloria selene), and Gray Comma (Polygonia progne) that reach their southern limit here (Daniels, Wood Duck 27(6):96-98). Two Lepidoptera also reach their southern limit here, Arctic Skipper (Carterocephalus palaemer) and White Mustard (Pieris napi oleraceo) (Wormington, pers. comm.).

Masked Shrew (Sorex cinereus cinereus)

(Warren, Prince and Henderson MS and ROM #74982, 74987 - 74991, and 75006, 1975). Common throughout Ontario but more sparingly distributed towards the extreme south. In wet hardwood forest and along streams among cedars in the Swamp.

Smoky Shrew (Sorex fumeus fumeus)

(ROM #32707; and 75026, 1975). Not recorded from extreme southwestern Ontario or along Lake Erie (Peterson 1966, 37). In cool damp forest, most common in deep moss or litter (ibid., 38).

Water Shrew (Sorex palustris albibarbis)

(Warren, Prince and Henderson MS; ROM #20672, 32601, 32602, 32610, and 32761). Reaches its southern limit in Ontario at this location. Banks of fast boreal streams - Henderson in litt., ROM. Only Wentworth location.

Star-Nosed Mole (Condylura cristata cristata)

(Warren, Prince and Henderson MS; ROM #32611). While not rare, toward the south of Ontario, sparingly distributed or absent, since it prefers swamps and bogs.

Snowshoe Hare (Lepus americanus virginianus)

(Warren, Prince and Henderson MS; de Vos (1962) recorded a few tracks in the Swamp during the winter of 1956). Reaches present southern limit in the province in the Swamp, one of two recent county sites for it. If protected from hunting, may continue to survive in this sizeable pocket of suitable range (de Vos, pers. comm. to Campbell, 1957).

Northern Flying Squirrel (Glaucomys sabrinus macrotis)

(ROM #74973, 1975). Reaches approximate southward limit in Ontario here. Only definite Wentworth occurrence.

Woodland Deer Mouse (Peromyscus maniculatus gracilis)

(ROM #74950 - 74964). Most numerous small mammal trapped in the Swamp by ROM field party, September 1975. Found in wet hardwood forest, along streams, in hardwood uplands and in wet mixed forest of white birch and cedar. Near its present southward limit in Ontario, and a mouse of cool northern forests (Banfield 1974, 166). Only Regional locality.

Meadow Jumping Mouse (Zapus hudsonius canadensis)

(Warren, Prince and Henderson MS and ROM specimens). Most Wentworth County collections of this locally-distributed mouse are from the Swamp where it occurs even along the edge of cool streams in boreal forest, in the same habitat as the next species.

Woodland Jumping Mouse (Napaeozapus insignis algonquinensis)

(Warren, Prince and Henderson MS and ROM #20671, 32632, 32633, 32669 and 32710). At southern limit in Ontario, occurring in boreal zones along streams, for example 2.5 miles southwest of Freelon. Only county location.

Porcupine (Erethizon dorsatum dorsatum)

(Warren, Prince and Henderson MS, four miles east of Freelon). Near present southern limit in Ontario; it may still survive here because of the large tract isolating it from persecution. Only definite county location.

Coyote (Canis latrans thamnias)

(Recorded as possibly occurring in Warren, Prince and Henderson MS).

Mink (Mustela vison vison)

(Warren, Prince and Henderson MS). Swamp trout streams ideal habitat for this valuable fur-bearer.

Blanding's Turtle (Emydoidea blandingi)

(G. North, pers. comm. to Campbell, 1971). Irregularly distributed throughout southern Ontario, especially in extensive marsh-swamp areas; more common to the south and west. One of 3 Wentworth reported occurrences.

Eastern Fox Snake (Elaphe vulpina gloydi)

(L. Travers, pers. comm. to Campbell, 1972). Away from Lake Erie and Georgian Bay very scarce in Ontario. Declining from persecution and loss of extensive wetland habitat. Only Wentworth locale; this report should be carefully checked.

Wood Turtle (Clemmys insculpta)

Recorded from nearby Halton County locales along the Bronte Creek drainage (Logier and Toner 1961; Campbell 1973), it possibly occurs here in Wentworth County. Very scarce in southwestern Ontario, and perhaps endangered throughout Ontario (Campbell 1975). Probably found in Bronte Creek headwater areas.

Beaver (Castor canadensis)

Reported to have blocked a road culvert in the swamp recently (Howell, pers. comm.).

American Bittern (*Botaurus lentiginosus*)

(Beverly Swamp - a few pairs can be heard calling every year in breeding season - Curry pers. comm.). Nests found in cattails, bulrushes and similar vegetation: occasionally in dry fields (Godfrey, 1966). Only common in freshwater marshes. One of only two Regional nesting areas. The scarceness of this species reflects upon the large loss of habitat in the last 50 years due to marsh destruction around Hamilton Harbour (North pers. comm.).

Virginia Rail (*Rallus limicola*)

(Beverly Swamp - often heard calling in marshes of this area - Curry, pers. comm.). This species nests in freshwater marshes (Godfrey, 1966). With the loss of shoreline marsh in the last 200 years, in this Region, this bird has declined, like many other marsh species. It nested in surprisingly small scraps of marsh left in the industrial area of Hamilton in the 1960's (ONRS). Only four known Regional nesting areas.

Marsh Hawk (*Circus cyaneus*)

(Beverly Swamp - in field near swamp - pairs - Curry, pers. comm.). The nest is placed on the ground among low bushes in other low vegetation usually in a moist meadow or marshy place (Godfrey, 1966). This species has declined significantly, as a nesting species, in this Region in the last 40 years (North, pers. comm.).

Long-eared Owl (*Asio otus*)

(Beverly Swamp - North, pers. comm.). The nests are in woodland, usually 10 to 30 feet up in a tree in an old hawk or crow nest. The habitat is usually the denser parts of woods (not necessarily extensive) the preferred being coniferous or mixed woods (Godfrey, 1966). This is one of six Regional nesting stations but the birds are probably no longer present in Westdale Park.

Whip-poor-will (*Caprimulgus vociferus*)

(Beverly Swamp - fair numbers - Curry, pers. comm., Kirkwall, North, pers. comm.). The eggs are laid on bare ground on leaf litter in ungrazed woodlands of various developments, especially those with

openings (Godfrey, 1966). This bird is known from four Regional stations but there may be a fair number throughout the north end of the Region (Curry pers. comm.).

Least Flycatcher (Empidonax minimus)

(Beverly Swamp - North, pers. comm.). The habitat includes: open deciduous or mixed woodland, forest edges, and openings, deciduous second growth, woodlots, copses, orchards, suburban shade trees, city parks, and alder thickets. Nests are built in an upright crotch of a tree or shrub usually 5 to 25 feet above the ground (Godfrey, 1966). Two breeding stations are known for sure but indications are that it is a scarce but regular breeder throughout the northern woods of Flamborough Township (Curry, pers. comm.).

Alder Flycatcher (Empidonax alnorum)

(Beverly Swamp - Curry pers. comm.). Typically a bird of alder and willow thickets, usually along water (Godfrey, 1966). No confirmed nests have been found recently but this species can be found each summer in the Beverly Swamp (Curry, pers. comm.). Only one of two Regional stations.

Brown Creeper (Certhia familiaris)

(Beverly Swamp - North, pers. comm., 2 or 3 areas - Curry, pers. comm., nest with 3 young - Wood Duck 19(2):24). The preferred habitat is primarily mature coniferous or deciduous woodland with nests placed under a piece of loose tree bark or in a naturally cavity such as an old woodpecker hole (Godfrey, 1966). Two areas contain this bird as a nester.

Northern Waterthrush (Seiurus noveboracensis)

(Beverly Swamp - North, pers. comm.; C. Wood, pers. comm.; widespread through the swamp - Curry, pers. comm., breeding in swamp - Peck, 1975). Habitat is shrubby thickets, notably alder and willow, near water along streams, ponds, and lakes, swamps, bogs, and wet parts of woodlands with shallow pools of water. Nest is placed in roots of an upturned tree, stump or bank (Godfrey, 1966). One of two Regional nesting areas that are significant because they are south of the recognized breeding range in Canada (Godfrey, 1966).

Canada Warbler (Wilsonia canadensis)

(Beverly Swamp - found here in breeding season - Curry, pers. comm.). Habitat is shrubbery undergrowths of woodlands, tall shrubbery such as alder and willow along streams, swamps, and similar moist places. Nests placed on or near the ground under a sapling, in a mossy hummock, on a mossy stump or log, in a bank cavity, or among the roots of an upturned tree (Godfrey, 1966). This species should be looked for carefully to determine its breeding status more definitively. One of two known summering stations.

Black and White Warbler (Mniotilta varia)

(Occurs in areas of the Beverly Swamp south of Valens in breeding season - no nests found - Curry, pers. comm.). Habitat is deciduous and mixed woodlands of various types, especially in moister situations. Nests on the ground in a slight depression (Godfrey, 1966). This species must be considered to be a hypothetical nester in the Beverly Swamp until a confirmed nest is found.

Nashville Warbler (Vermivora ruficapilla)

(Occurs in Beverly Swamp south of Valens in breeding season, no nests found - Curry, pers. comm., males heard singing on territory in June - Dowall, pers. comm.).

Habitat is sparse immature deciduous or mixed woods and nests are placed on the ground, usually well concealed by shrubs or in a mossy hummock (Godfrey, 1966). This species must be considered to be a hypothetical nester in the Beverly Swamp until a confirmed nest is found.

Swamp Sparrow (Melospiza georgiana)

(Beverly Swamp - found in marshy edges - North, pers. comm.). Nests are placed in a tussock of marsh vegetation or low in a bush and in breeding season the bird is found in wetlands solely (Godfrey, 1966). Only five known breeding stations are known but is this bird really this rare?

White-throated Sparrow (Zonotrichia albicollis)

(Beverly Swamp, south of Valens - found there singing on territory in summer months - Curry pers. comm.). Nests are placed on the ground beneath a shrub or in a clump of grass in bushy openings in or on edges of woodlands (mostly coniferous or mixed wood), burntlands, clearings cluttered with slashing, open young woodlands and thickets (Godfrey, 1966). In neighbouring Waterloo Region this species is found only in northern-type bogs and swamps (Eagles, pers. comm.). Must be considered a hypothetical nester in this Region.

Great Blue Heron (Ardea herodias)

About 75 active nests were found in May 1976 (Wormington, pers. comm.).

Criterion Six

Many of the species mentioned under Criterion Five are rare and endangered in the Region, as is indicated in the written descriptions of most of the species. Except for the Dundas Valley, no other piece of landscape in the Hamilton-Wentworth Region provides essential habitat for so many rare species. Because they are rare, these species are in danger of disappearance due to man-made development or natural ecological change.

Criterion Seven

The size of the swamp (4,850 acres - estimated from topographic maps) and its wooded connections with adjacent wooded areas to the north, west, south and east make it important for providing a habitat for species which are intolerant of human disturbance. In the last 200 years man has cleared the land and left only small wooded areas in most places. In 1958 only 10.3% of the Hamilton-Wentworth Region was still in forest (Department of Lands and Forests, 1958). The swamp is an exception in that it is part of one large, unbroken stretch of forest and therefore provides habitat for species that require such landscapes for survival.

Criterion Eight

All the factors mentioned above point to the Beverly Swamp as being important from a scientific research point of view. The swamp could serve as field research area for many fields, but especially those associated with applied ecology.

Some areas could be used for conservation education purposes (i.e. for the explanation of the importance of swamps as natural water storage areas). Such uses would have to be considered carefully to avoid undue disturbance of the swamp's fragile ecosystem.

Criterion Nine

The sight of the large unbroken forest, from the surrounding moraines and drumlins, is excellent in places. This particular part of the Region's scenic landscape is largely unknown to the residents of the major urban areas.

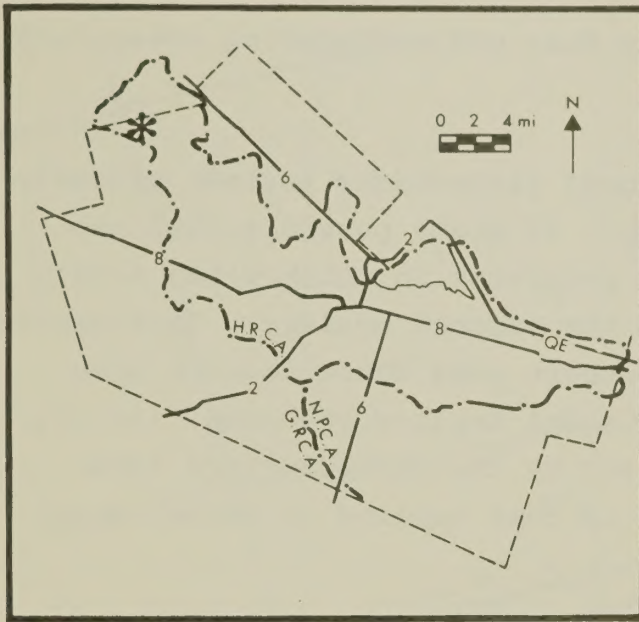
The sight of the swamp from the large drumlin, just west of Kirkwall on the 8th Concession, and from the drumlins on the 7th Concession, is excellent and is easily attainable from the township roads.

NEGATIVE IMPACT PROBABLE ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION	●	
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY	●	
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT	●	
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

The swamp is a large and diverse natural community. The above summary of potential impacts is a general representation for the entire swamp. It is certain that some areas in the swamp can stand no disturbance, including those associated with passive recreation and extensive forestry.

The water quality in the streams in the swamp is now very good and land uses outside the sensitive area that have the potential of causing groundwater or stream pollution should be considered carefully.



NAME

Valens Conservation Area

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Public -

Hamilton Region Conservation Authority

Some Private

SIZE

578 acres

LOCATION

Flamborough Township, north of Highway 97 at Valens.

GENERAL DESCRIPTION

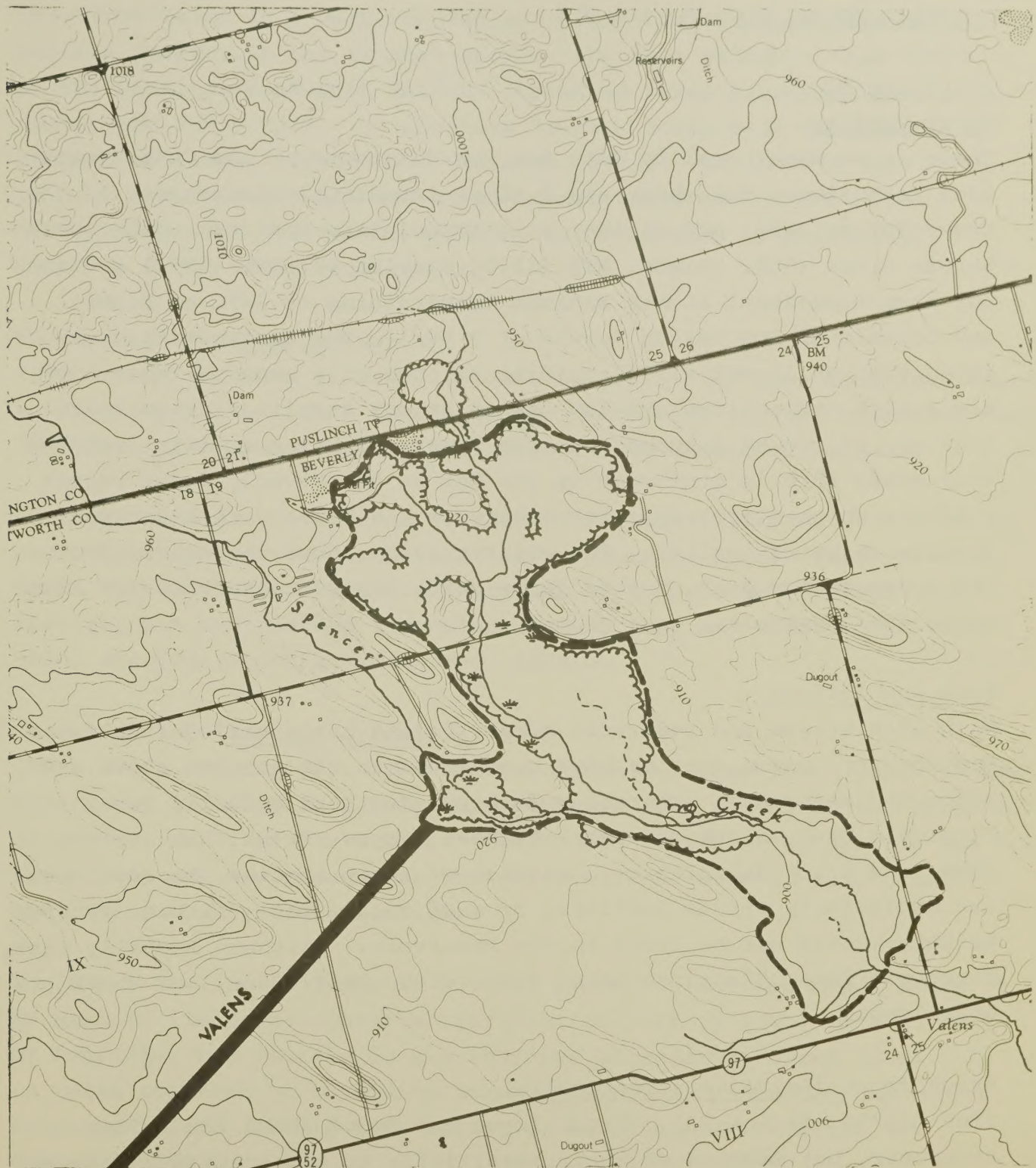
There is a variety of ecological habitats found in this sensitive area. They include: mowed fields, long grass fields, lake, river, cat-tail marsh, lowland forest swamp, upland deciduous forest, conifer plantation and sedge meadow. The junctions between habitats act as habitats in themselves and are particularly important for wildlife production.

The developing cat-tail marsh is particularly important as this type of habitat is disappearing quickly elsewhere in the Region, particularly along the Lake Ontario shoreline.

The Valens Environmentally Sensitive Area is comparable to the Beverly and Fletcher Creek Swamps in that its formation and physical function are dependent upon the surrounding moraines, Galt and Moffat. The swamp, in the northern section, has a muck soil which is a poorly drained accumulation of organic materials 12 inches or more in depth. Other soils occurring in the area are; well-drained Dumfries Loam and imperfectly drained Killeen Loam. Both these soils are developed on sandy gravelly loam. The Guelph, London and Parkhill loams occur in the south of the area and are developed from loam till.

Most of the area itself is relatively flat but surrounding areas have slopes ranging up to and over 10%.

Runoff, interflow, throughflow and local groundwater regimes probably supply most of the water to the swamp. It seems possible that the wetland in turn may act as a seepage reservoir in which water slowly migrates through organic matter into the bedrock aquifer. This process is probably more prominent in the southern area where bedrock lies close to the surface. Although this model implies recharge, its significance in the Valens area is limited by the small surface area available for penetration. The idea is best applied to larger areas such as the Beverly Swamp.



2

Topographic Map Reference - ABERFOYLE 40P/8g Edition 1

Military Grid Reference - 690045



0 SCALE 1 : 25,000 1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 4, 6 and 8

Criterion Four

Water Quality

There is no water quality data for the Reservoir or the Conservation Area themselves; but there are 2 sites immediately downstream of the Conservation Area, and another site immediately upstream. The downstream sites (MOE, Valens, MNR (1973, station 21; MNR (1973) station 20) have occasional summer maximum temperatures of 24°C or higher, and occasional low oxygen levels of 5 mg/l. The upstream station (DLF, station 1; MNR (1973) station 22) was only sampled twice, but had a high temperature and low oxygen at one sampling. From these figures, it can be assumed that the Reservoir water quality is not very good; this is confirmed by the MNR in the Beverly Swamp report (1975b), which states that the reservoir has greatly influenced downstream water quality. The water quality above the Reservoir, in the Conservation Area, may be quite good, since Brook Trout are found above the Reservoir.

Fish Populations

With both stream and reservoir areas, Valens has a varied fish fauna. A number of common species have been found in the streams above and below the Reservoir: Central Mudminnow, Northern Redbelly Dace, Finescale Dace, Blacknose Dace, Fathead Minnow, Creek Chub, Pearl Dace, and Brook Stickleback. Several of these species, because they are exclusively stream dwellers, or need clear, cool, flowing water, or both, would not be found in the Reservoir: Northern Redbelly Dace, Finescale Dace, Blacknose Dace, Creek Chub, Pearl Dace, and Brook Stickleback.

Brook Trout (Salvelinus fontinalis)

(MNR (1973) station 22). Brook Trout are found above the Valens Reservoir, but because of their sensitivity to temperature and oxygen level, it is probable that there are none in the Reservoir.

The Brook Trout is a very popular and highly valued game fish in eastern Canada; it is, to most people, the most valuable fish found in the Hamilton-Wentworth Region. Spawning takes place in late summer and early fall. It inhabits "clear, cool, well-oxygenated streams and lakes" (Scott and Crossman, 1973). It is very sensitive to high temperatures and low oxygen concentrations; in fact the division between cold-water and warm-water streams is primarily based on Brook Trout requirements.

Northern Pike (Esox lucius)

(MNR Sensitive Areas D. Howell, pers. comm.). Pike have been introduced in Valens Reservoir, and there are now "excellent angling opportunities" (MNR Sensitive Areas Mapping) for pike in the Conservation Area.

Northern pike are found in a variety of habitats, but most often clear, warm, heavily vegetated waters of slow rivers or bays. They spawn in April or early May. Pike are important as a sport and a commercial species, but may also be a problem because they eat other, more valuable, species (Scott and Crossman, 1973).

Green Sunfish (Lepomis cyanellus)

(MNR (1973) station 21). The Green Sunfish has been found below Valens Reservoir; it is quite likely that it could have colonized the Reservoir as well, given its wide habitat tolerance. Sunfish (the species was not specified) are now present in the Reservoir (D. Howell; pers. comm.); they are probably Green Sunfish.

The Green Sunfish is found in several places in Spencer Creek where it is east of its normal Ontario distribution. It is found in a variety of habitats, but usually in the shallows of moderate-sized lakes. It is quite tolerant of turbidity, more so than other Canadian sunfishes. Spawning takes place in late spring or early summer. (Scott and Crossman, 1973).

Largemouth Bass (Micropterus salmoides)

(MNR Sensitive Areas Mapping, D. Howell, pers. comm.). Largemouth Bass were planted in Valens Reservoir by the MNR in 1966, and the Reservoir continues to produce excellent fish (D. Howell, pers. comm.).

Largemouth Bass are usually found in warm, shallow lakes or bays, almost always in areas with dense aquatic vegetation. They can withstand some turbidity, and high temperatures, but are not tolerant of low oxygen conditions. Spawning takes place between late spring and mid-summer. The Largemouth Bass is an important sport fish in eastern Canada. (Scott and Crossman, 1973).

Criterion Six

Pickereel Frog (Rana palustris)

(Clayson and Whiting 1965, 21). A locally-distributed and possibly-declining frog of cool waters; warm water and pollution seldom tolerated by this delicate species (Campbell MS 1975). One of 3 recorded Wentworth locales.

Least Bittern (Ixobrychus exilis)

(Valens - colony establishing at reservoir - McLaren, pers. comm.). Nests in freshwater marshes (Godfrey, 1966). Once common in the Region (McIlwraith, 1886) but now rare due to habitat destruction associated with landfill projects and wetland drainage (North, pers. comm.).

Long-eared Owl (Asio otus)

(Valens - 3 young out of nest - Wood Duck 15(1):15). The nests are in woodland, usually 10 to 30 feet up in a tree in an old hawk or crow nest. The habitat is usually the denser parts of woods (not necessarily extensive), the preferred being coniferous or mixed woods (Godfrey, 1966). This is one of six Regional nesting stations but the birds are probably no longer present in Westdale Park.

Cliff Swallow (Petrochelidon pyrrhonota)

(Valens - there for several years but not seen in 1975 - Curry, pers. comm.). Highly colonial, mud nests are built on cliffs, canyons and often on man-made structures such as concrete bridges and culverts. Birds then forage widely over water, marshes and open land (Godfrey, 1966). This uncommon bird, with a spotty distribution, is found in three places in the Region. It is not necessarily sensitive to development but requires open water for drinking and foraging, mud for nesting material and many insects for food.

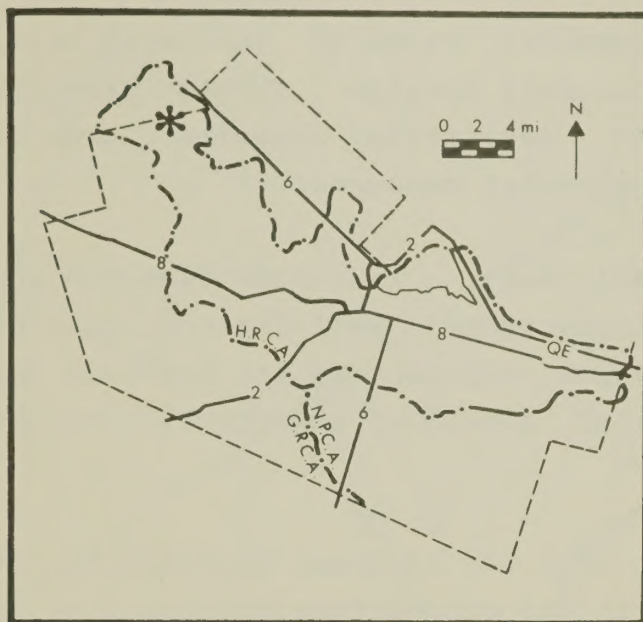
Criterion Eight

The presence of the Conservation Area and the associated facilities along with the variety of landscapes and biological communities (cat-tail marsh, upland deciduous forest, lowland forested swamp, river, reservoir, long grass fields, mowed fields and conifer plantations) provides a good opportunity for using the area for conservation education purposes. The distance from Hamilton, and the associated transportation costs may be a disadvantage.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE		
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

Certain areas, namely the forested swamps, should not be disturbed. Such wet, sensitive soils and the associated plants are very readily disrupted, even by activities as mild as numbers of people walking through them.



NAME

Fletcher Creek Swamp Forest
(Crieff Bog)

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

A

OWNERSHIP

Private

SIZE

1,697 acres

LOCATION

This swamp straddles the line between Wellington County (Puslinch Township) and the Regional Municipality of Hamilton-Wentworth (Flamborough Township), approximately 15 miles east of the city of Cambridge.

GENERAL DESCRIPTION

This large, forested swamp is approximately 3 miles long. The majority of the vegetation is a lowland, cedar swamp forest with scattered openings of sedge meadow or cleared knoll. The swamp forest contains black ash, willow, elm, white birch and largetooth aspen as well as the white cedar. The cold water streams and sedge meadows, such as the Crieff Bog, are unusual in this Region.

The Fletcher Creek Swamp is situated between the Galt moraine and the Moffat moraine in a depression formed during the deposition of these two features. The swamp serves as a water collection area for drainage from the Galt moraine. The swamp itself is drained to the south by Fletcher Creek into the Beverly Swamp.

The Moffat moraine consists of 10 to 50 feet of clay, sand, gravel and pebbles of the Wentworth till. The deposits are variable in composition and discontinuous in horizontal and vertical orientation. The Moffat moraine probably represents brief halts of the ice sheet during its retreat from the Galt moraine.

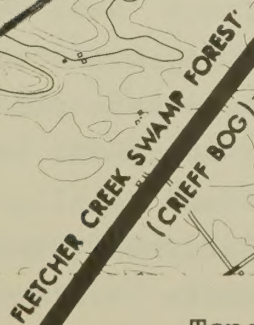
The Galt Moraine is a prominent, hummocky ridge of Wentworth till. Near Fletcher Creek, but within the Galt moraine, outwash gravels, kame gravels and shallow water lacustrine deposits provide economically extractable sources of granular resources.

The swamp itself has a muck, organic soil. The areas between the northern three arms are of exceedingly stony, well-drained, shallow Farmington soils. The other major soils adjacent to the area are the well-drained Dumfries Loam with smaller pieces of imperfectly drained Killeen and London Laom.

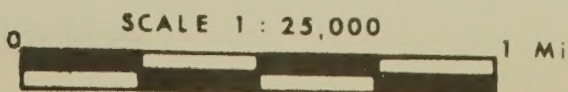
The swamp itself is a flat low lying area but adjacent drumlins to the west and the Galt moraine to the north has slopes ranging from 5 to 15 per cent.

A considerably large outcrop of the Guelph dolomite extends across the northern part of the Fletcher Creek Swamp. Several old quarries are situated in this outcrop. On lots 27 and 28 and Puslinch Gore, diamond drilling penetrated 42 feet of Guelph dolomite and bottomed in the Eramosa dolomite at a depth of 90 feet. The upper 60 feet of the dolomite are of high quality and are suitable for chemical and flux stone (Vos, 1968). The potential impact on the sensitive area of possible quarrying could be large.

The Crieff Bog, which is more of a sedge meadow than a bog, is a very unique area that contains rare and sensitive herbaceous plants. Shallow-water, sandy, lacustrine and outwash gravels underlie this meadow. This is the only location within the swamp, where such lake filling processes are found.



Military Grid Reference - 718064



1976

CRITERIA FULFILLED - 2, 3, 4, 5 and 6

Criterion Two

The local ground water aquifer is found at variable depths (0 to 60 feet) in the fractured Guelph dolomite bedrock. The moderate groundwater flow is from the Galt Moraine to the south along a moderate north to south slope in the bedrock. The major high infiltration area is the Galt moraine. The Fletcher Creek Swamp is probably recharging the bedrock aquifer, but only in a secondary fashion compared to the Galt moraine. Recharge is significant in all areas north of the Westover Drumlins, in the study area.

Very few wells are located in the surficial deposits immediately surrounding the swamp. Wells in the area have an average yield of from 20 to 30 gallons of fresh water per minute from the bedrock aquifer. Local groundwater flow, through flow and interflow probably contribute significant quantities of water to the drainage system during spring thaw and periodic rain storms. Agricultural and road salt pollution must not be allowed to enter the groundwater aquifer or the surface waters of the sensitive area.

Criterion Three and Five

There is a diversity of biological communities that includes: sedge meadow, tamarack bog, lowland cedar swamp, lowland deciduous swamp, upland cedar forest and some upland deciduous forest.

The open sedge meadows hold an interesting community of organisms that is seldom found in the study area. The presence of many rare plants indicates unique ecological conditions that are uncommon. The appropriate mixture of soil ph, soil type, incident sunlight, groundwater, open woody vegetation and somewhat undisturbed state, allows the community to exist. The following rare plants are known from one well-known sedge meadow called Crieff Bog and are often studied there by the Hamilton Naturalists' Club: Naked Miterwort (Mitella nuda), Starflower (Trientalis borealis), Bunchberry (Cornus

canadensis), Twinflower (Linnaea borealis), Fringed Polygala (including albino specimens) (Polygala paucifolia), Early Coral-Root (Corallorhiza trifida), Nodding Ladies-Tresses (Spiranthes cernua), Green Woodland Orchis (Habenaria clavellata), Calopogon (Calopogon pulchellus), Loesel's Twayblade Orchid (Liparis loeselii), Adder's-Mouth (Malaxis monophylla), Leafy Northern Green Orchis (Habenaria hyperborea), Bog-Candle Orchis (Habenaria dilatata), Yellow Ladies' Slipper (Cypripedium calceolus L. var. pubescens), Showy Ladies' Slipper (Cypripedium reginae) - more than 100 plants seen in 1969. Small Cranberry (Vaccinium Oxycoccos), Pink Pyrola (Pyrola asarifolia), Round-Leaved Sundew (Drosera rotundifolia), Pitcher Plant (Sarracenia purpurea), and Labrador Tea (Ledum groenlandicum) (S. Wood - pers. comm.) Ram's-Head Orchid (Cypripedium arietinum), Arethusa Orchid (Arethusa bulbosa) and Cardinal Flower (Lobelia Cardinalis) (Shivas - pers. comm.)

Criterion Four

There is only one site with water quality data available, within the Fletcher Creek Forest, and the site (DLF, station A, MNR (1973), station 9) has only been sampled twice. Both samples gave low summer temperatures and high oxygen levels. The high water quality downstream in Beverly Swamp indicates a significant aquatic environment. Cold water streams are rare in the Region.

The fish fauna here is similar to that in the Beverly Swamp, with a few less species. Most are common in the Region, and therefore not described below. They are Central Mudminnow, Northern Redbelly Dace, Common Shiner, Blacknose Dace, Creek Chub, Pearl Dace, White Sucher, and Brook Stickleback.

Brook Trout (Salvelinus fontinalis)

(Dept. of Commerce and Development 1960, DLF, station A, MNR (1973) station 9) The Brook Trout is a very popular and highly valued game fish in eastern Canada; it is, to most people, the most valuable fish found in the Hamilton-Wentworth Region. Spawning takes place in late

summer and early fall. It inhabits clear, cool, well-oxygenated streams and lakes (Scott and Crossman, 1973). It is very sensitive to high temperatures and low oxygen concentrations; in fact the division between cold-water and warm-water streams is primarily based on Brook Trout requirements.

Criterion Six

Several species survive here, that are rare in the Region.

Snowshoe Hare (Lepus americanus virginianus)

(Warren, Prince and Henderson MS.) Reaches present southern limit in province near here, and in Beverly Swamp, the two recent county sites for it. If protected from hunting, may continue to survive as long as habitat remains suitable. Continued presence in Fletcher Creek Swamp should be checked.

Long-eared Owl (Asio otus)

(Fletcher Creek Forest - C. Wood pers. comm.) The nests are in woodland, usually 10 to 30 feet up in a tree in an old hawk or crow nest. The habitat is usually the denser parts of woods (not necessarily extensive) the preferred being coniferous or mixed woods (Godfrey, 1966). This is one of six Regional nesting stations but the birds are probably no longer present in Westdale Park.

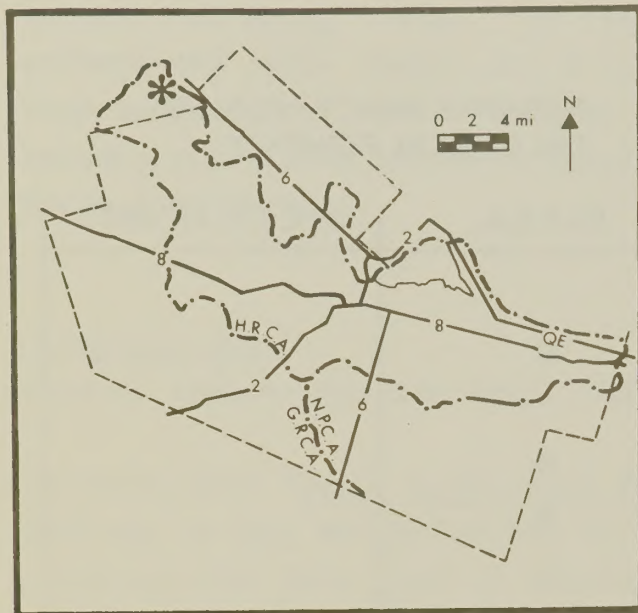
Virginia Rail (Rallus limicola)

(Fletcher Creek Swamp - downy young observed - C. Wood pers. comm.) This species nests in fresh water marshes (Godfrey, 1966). With the loss of shoreline marsh in the last 200 years, in this Region, this bird has declined, like many other marsh species. It nested in surprisingly small scraps of marsh left in the industrial area of Hamilton in the 1960's (ONRS). Only four known Regional nesting areas but may be somewhat more common than indicated.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION	●	
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY	●	
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT	●	
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

There is a large potential impact on the sensitive area from quarrying activities associated with the Guelph dolomite outcropping.



NAME

Crieff Old Field Complex

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Private

SIZE

338 acres

LOCATION

One mile west of Highway 6 and just north of Crieff Road in Wellington County.

GENERAL DESCRIPTION

This is a very hilly area with slopes ranging between 15 and 30 percent. Most of the trees have been removed in the past due to agriculture - associated activities and the dominant vegetation is now hardy, open-field, herbaceous plants. Surface erosion has occurred on most of the cultivated slopes of the Galt moraine and in places the whole soil profile has been removed.

The major soil type is the well-drained Dumfries loam that has developed on the stony Wentworth till of the Galt moraine.

Data from well logs suggest that about 80 to 100 feet of surficial, gravelly till overlies the limestone bedrock. About one-half mile to the southwest of the fields in question a driller has encountered bedrock only one foot from the topographic surface. This bedrock high implies that the bedrock surface may also be quite hummocky.

Many wells penetrate small gravel aquifers in the area. On the average they produce 10 to 20 gallons per minute. The bedrock aquifer is also

quite productive. Flow rates are difficult to assess for local gravel aquifers, but in all likelihood they serve to recharge the regional bedrock aquifer.

Porous overburden, imperfect drainage and numerous depressions make this area a probable high infiltration zone which serves to recharge the stream headwaters a short distance to the south.

HAMILTON - WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

AREA
NO .

4



4

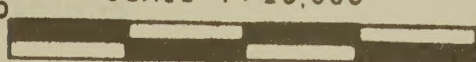
Topographic Map Reference - FREELTON 40P/8h Edition 2
ABERFOYLE 40P/8g Edition 1

Military Grid Reference - 708090



SCALE 1 : 25,000

1 Mi



ecologistics limited

1976

CRITERIA FULFILLED - 3 and 6

The following species of birds were found in the fields (and probably bred) in the summer of 1972: Dickcissel (part of the minor invasion into southern Ontario staged by this bird in the summer of 1972), Henslow's Sparrow (very rare and 1972), and Grasshopper Sparrow (Curry and S. Wood, pers. comm.). Both yellow-billed and black-billed cuckoos frequented nearby woods, (Wood Duck 26(3):42) with young birds found.

Other rare bird species included:

Marsh Hawk (Circus cyaneus)

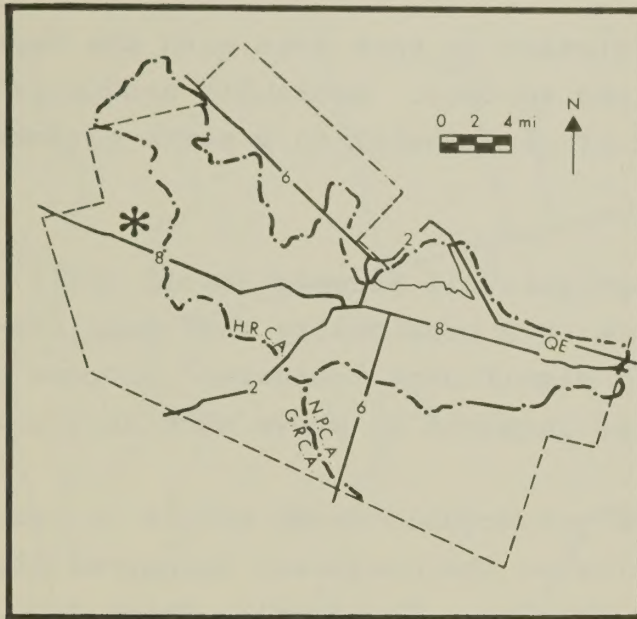
(Crieff Field - Curry, pers. comm. - Wellington Co.). The nest is placed on the ground among low bushes or other low vegetation, usually in a moist meadow or marshy place (Godfrey, 1966). This species has declined significantly, as a nesting species, in this Region in the last 40 years (North, pers. comm.). Four stations in Hamilton-Wentworth Region and this one in Wellington County.

Short-billed Marsh Wren (Cistothorus platensis)

(Crieff Field - singing on territory in 1972 - Curry, pers. comm.). Habitat is moist grass and sedge marshes, bogs and damp meadows, often with a scattering of low bushes and often bordering willows or alders. The nest is a ball of grass well hidden in the upright grass or sedge to which it is attached, with an entrance to the side (Godfrey, 1966). One of two known locations in the study area but may be found on wet meadows in Flamborough Township (North, pers. comm.).

**NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS**

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION	●	
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE		
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	●	
AIR POLLUTION	●	●
STREAM POLLUTION		
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●



NAME

Beverly Sparrow Field
Hyde Tract and Rockton Tract
CONSERVATION AUTHORITY

Grand River

CATEGORY

A

OWNERSHIP

Private and Public (Hamilton-Wentworth Region Agreement Forests managed by Ontario Ministry of Natural Resources, Cambridge District Office)

SIZE

1,255 acres

LOCATION

Northwest of the village of Rockton in Flamborough Township.

GENERAL DESCRIPTION

Two publicly owned forestry tracts, the Hyde and Rockton tracts, and a privately owned Christmas tree farm, the Beverly Sparrow Field, make up this Environmentally Sensitive Area. The rather passive land uses have allowed the natural biological communities to develop a relatively high ecological diversity.

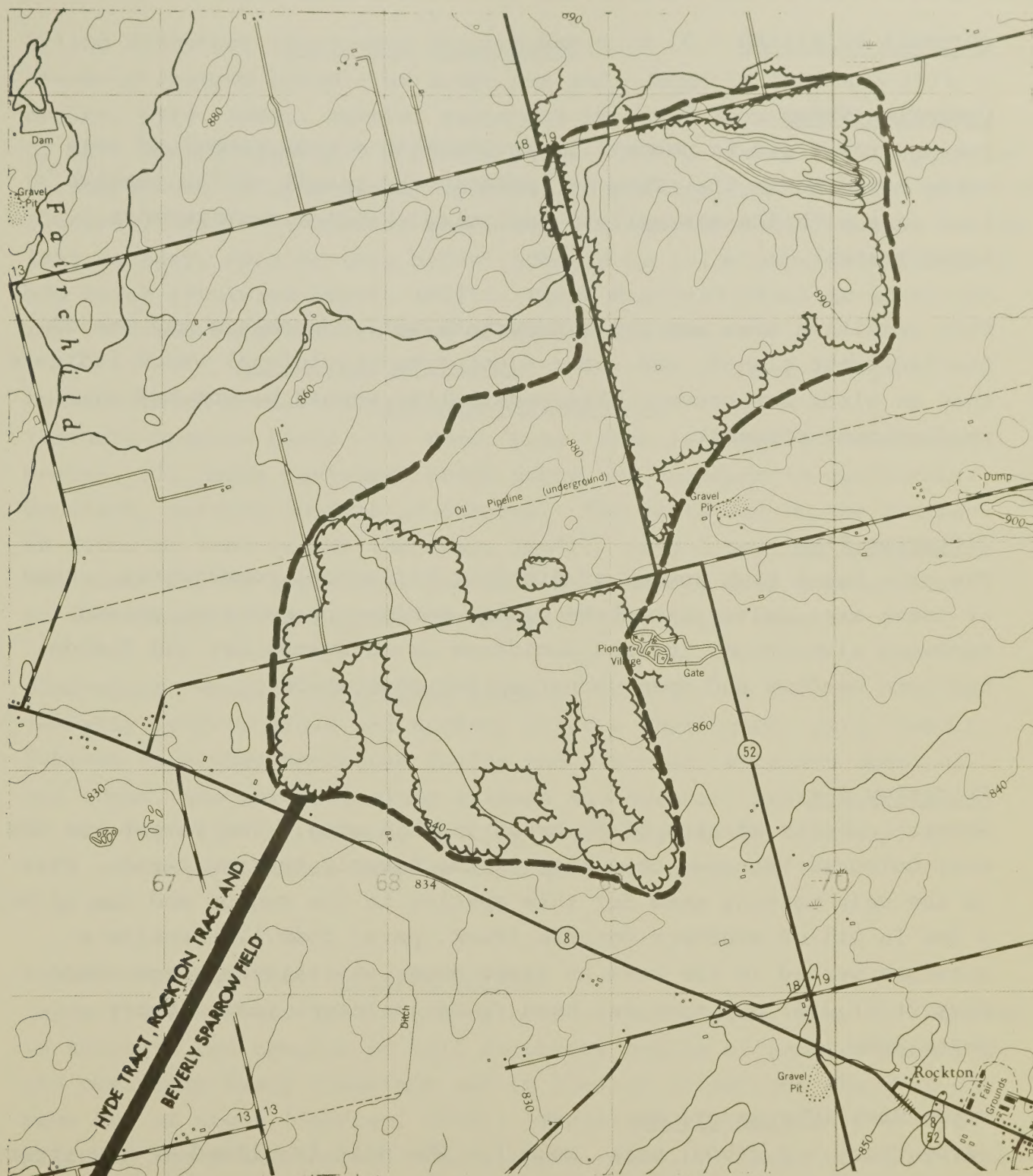
The area is largely one of shallow (less than 36 inches) lacustrine deposits over a bedrock plain that is exposed in many places. The bedrock consists of buff-coloured Guelph dolomite underlain by grey to blue dolomite of the Amabel group.

Developed on the surficial deposits are a variety of soils. The major soil is the well-drained Farmington loam which has developed on less than 12" of loam till over bedrock. The well-drained Guelph loam occurs sporadically, usually developed on 12 to 36 inches till over bedrock. Several shallow silt loams such as the Tuscola, Toledo, Beverly and Colwood are also present. Vineland sandy loam, in its shallow phase, occurs in the area and has developed from a shallow deposit of lacustrine fine and medium sand.

Local groundwater regimes are non-existent in this area with the bedrock aquifer found at depths between 20 and 80 feet. Hydraulic gradients suggest a slow to moderate movement of groundwater in a south-southeasterly direction.

The assumption must be made that most rainfall becomes runoff until field studies prove otherwise. There is a possibility that infiltration into fractured bedrock may be a significant "recharge" process in this area. However, field work is required to prove such an idea.

Most of the area is well-drained but one dogwood swamp occurs in the Rockton tract and one small swamp sits on the northeast corner of the sensitive area behind a well-formed drumlin. The drumlin shows two unique features: a raised shoreline (on the south side) that was formed when a glacial lake covered the area and the drumlin was an island in the lake, and some beach gravel on the west side deposited in the ancient Lake Whittlesey.



5

Topographic Map Reference - SHEFFIELD 40P/8b Edition 1

Military Grid Reference - 687973



SCALE 1 : 25,000

1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 3, 5, 6 and 7

Criterion Three

The sparrow field is unusual in having such a high number of rare birds breeding in it. This is probably the result of the passive land uses with the appropriate ecological habitat requirements being present.

This sensitive area has the appropriate soil components and one of the indicator plants, red cedar (Juniperus virginiana) which indicate that an alvar may occur. This possibility should be checked by a professional botanist.

Criterion Five

The area has a high number of distinct biological communities. Some of these are: alvar limestone plain, conifer plantation, upland hardwood plantation, lowland deciduous shrub swamp, dry old fields, hawthorn meadows and open young conifer plantation.

Criterion Six

Several species of rare birds breed in this area. The rarest are the Clay-coloured Sparrows that nest in the Beverly Sparrow Field. This is the only nesting area for this species in the region and one of only a few in all of southern Ontario (Peck, pers. comm.). Henslow's Sparrows nested in the area at least once, several years ago (Wood Duck 26(9):155) but have not been found in recent years (Curry, pers. comm.).

Marsh Hawk (Circus cyaneus)

(Hyde Tract - S. Wood, pers. comm.). The nest is placed on the ground among low bushes or other low vegetation, usually in a moist meadow or marshy place (Godfrey, 1966). This species has declined significantly, as a nesting species, in this Region in the last 40 years (North, pers. comm.).

Upland Sandpiper (Bartramia longicauda)

(Beverly Sparrow Field - at least one pair found in 1973 and 1974 - Eagles, pers. comm.; several pairs may be found here and to the west of here toward Highway 8 - Curry, pers. comm.). Nests in a depression on the ground in open grassy uplands: hayfields, pastures and prairies (Godfrey, 1966). Excessive shooting, for the commercial market in the last century, reduced this birds' numbers to a low ebb, from which it has never recovered (Bent, 1928). Three Regional stations known but may be found elsewhere in old, abandoned fields.

Golden-winged Warbler (Vermivora chrysoptera)

(Beverly Sparrow Field - S. Wood, pers. comm.). Habitat is shrubby wastes, old bushy pastures, bushy edges and openings in deciduous woodland, shrubby borders of streams. The nests are on the ground in ferns or weed stalks (Godfrey, 1966). Only 3 nesting stations are known in the Region but the bird is probably more common than so indicated in Flamborough Township (Curry, pers. comm.).

Blue-winged Warbler (Vermivora pinus)

(Beverly Sparrow Field and Rockton Tract - Wormington, pers. comm.). Habitat is brushy neglected fields and pastures, woodland openings and edges, and thickets along streams and swamps. Nests are placed on or very near the ground, usually among vegetation (Godfrey, 1966). This uncommon southern warbler is found in 3 areas in the Region.

Yellow-breasted Chat (Icteria virens)

(Hyde Tract - found just south of here - North, pers. comm.). Habitat is thickets and tangles of tall shrubbery beside streams or ponds, in old overgrown bushy clearings and in similar situations where it can keep out of sight (Godfrey, 1966). There are probably only 6 to 10 pairs in the entire Region (Curry, pers. comm.). These breeding areas are significant because they are north of the recognized breeding range for eastern Canada (Godfrey, 1966).

Clay-coloured Sparrow (Spizella pallida)

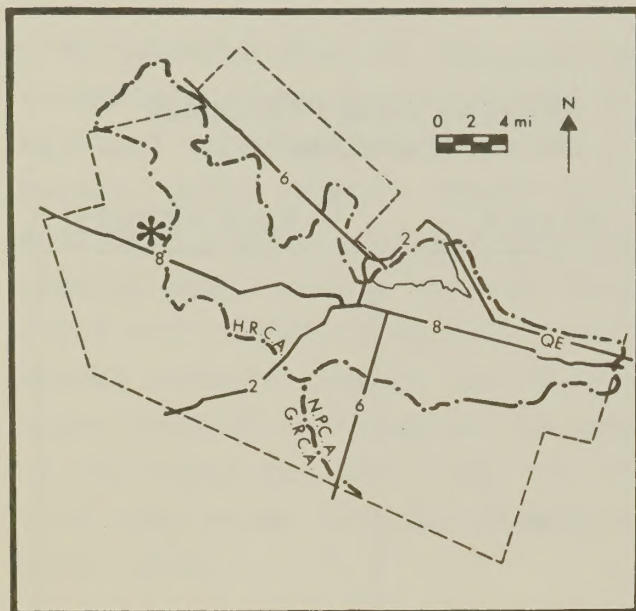
(Beverly Sparrow Field - found here every year in the only known Regional station - North, Wormington, C. Woods, Curry, Dowall, Eagles, pers. comm.). Nests are placed from 1 to 7 feet up in deciduous bushes or small conifers but occasionally on the ground. Prefers open shrubby habitat (Godfrey, 1966). This species is found each breeding season in this Christmas tree farm and it occurs nowhere else in the Region. Preferred management probably means leaving the area in the existing Christmas tree crop rotation. If the trees get too large the bird may leave. It is suspected that many males are mating with female Chipping Sparrows (Peck, pers. comm.).

Criterion Seven

The area is large in size (1,255 acres) but has been changed by past land-use activities. Nature is now healing the old scars and as a result the ecological conditions are changing and developing. The presence of the two forestry tracts, close to each other, produces a sizeable wildland area.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION		
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•



NAME

Rockton Wetland

CONSERVATION AUTHORITY

Grand River

CATEGORY

B

OWNERSHIP

Private

SIZE

341 acres

LOCATION

Immediately north and east of the village of Rockton in Flamborough Township.

GENERAL DESCRIPTION

This is a large, forested swamp along the west bank of Barlow Creek. It is mostly an ash - elm - maple swamp with scattered open areas containing willow, dogwood and spirea. The west and north sides grade into somewhat higher and drier forests.

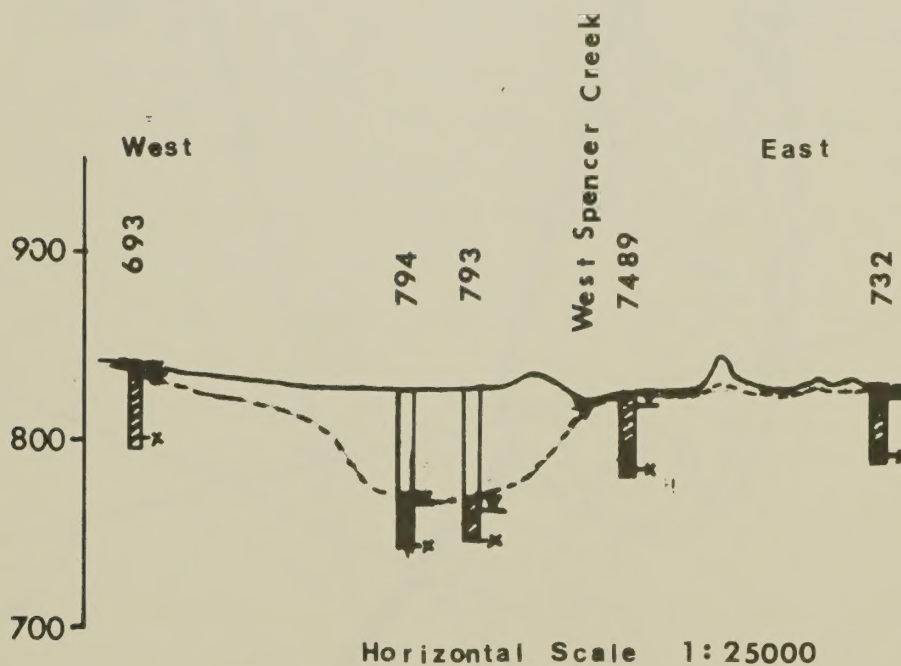
Barlow Creek runs through the east side of the area. Approximately 40% of the land is composed of Farmington Loam. This soil is well-drained and developed on less than 12 inches of loam till over bedrock. Another 40% of the soil is the poorly drained Flamborough sandy loam. This soil is developed from sand deposits. In the north of the area adjacent to the stream are small areas of Colwood silt loam - shallow phase and Tuscola silt loam - shallow phase. Both these soils have developed on thin lacustrine deposits of silt loam and fine sandy loam, generally less than 36 inches thick over bedrock. In the south occurs the Grimsby sandy loam - shallow phase. This soil is well-drained and developed in lacustrine fine and medium sand.

The topography is level to very gently sloping (0 to 2%) with a more undulating surface occurring on the Farmington soils (2 to 5%).

Soils lie directly on the Guelph dolomite throughout most of the sensitive area. Two wells in the southern portion penetrate 50 to 60 feet of surficial clay indicating that the bedrock outcrop is not continuous throughout the whole area.

This dip in the bedrock suggests the possibility of the occurrence of a small buried bedrock valley beneath Barlow Creek.

Cross-section Through Area



KEY

- | | |
|--------------------------------|----------------------|
| ▼ Creek | 808 Well Number |
| x Depth to Water | ▼ Static Water Level |
| ▨ Bedrock | Overburden |
| — Topographic Surface | Surface |
| ----- Inferred Bedrock Surface | |
| ↓ ↓ Sensitive Area Boundary | |

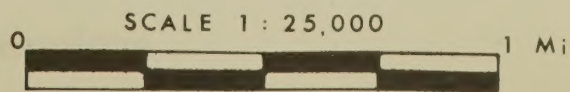
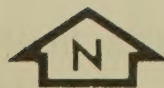
The groundwater in the area flows in bedrock at depths between 20 feet and 80 feet. Within the area, hydrogeologic relationships involving recharge and discharge are unknown, largely due to the small size of the study unit.



6

Topographic Map Reference - SHEFFIELD 40P/8b Edition 1
WESTOVER 40P/8a Edition 2

Military Grid Reference - 710960



ecologistics limited

1976

CRITERION FULFILLED - 6

Criterion 6

Several rare species occur in the area and a complete field survey should be undertaken to fill out knowledge of the Rockton Wetland.

Mourning Warbler (Oporornis philadelphia)

(Rockton Wetland - a few pairs can be found here - Curry, pers. comm.). The ground nest is placed in tangles of briery shrubs or other low vegetation. Habitat is shrubbery and bushes of young second growth on burntlands and clearings; woodland edges and sunny openings; margins of bogs and marshes (Godfrey, 1966). This uncommon warbler of lowland, open forests is found in only 5 areas in the Region.

There is no water quality data available for Barlow Creek. The closest sampling station is on Fairchild Creek, just below its junction with the Barlow. However, in the Fairchild Creek Survey (MNR, 1975a), it was stated that all tributaries north of the sampling station (MNR, 1975a, station 8) were dried up or remained as standing pools. The Fairchild Creek Report considered the Creek as a whole to be warm, with high turbidity.

Few fish could survive in standing pools over the summer, because of high temperature and oxygen depletion. Any resident species in the Rockton Wetlands probably have to move downstream in the summer.

Most of the fish caught at MNR station 8 (1975a) were common to the Region (Northern Redbelly Dace, Common Shiner, Bluntnose Minnow, Fathead Minnow, Blacknose Dace, White Sucker, Rock Bass and Fantail Darter). With the exception of the Rock Bass, all the species could live further upstream, from the sampling station, in periods of higher flow. The Rock Bass usually occur in the lower sections of streams and would probably not be found much further upstream.

Blacknose Shiner (Notropis heterolipis)

(MNR (1975a), station 8). This is the only recent record of the Blacknose Shiner in the Hamilton-Wentworth Region.

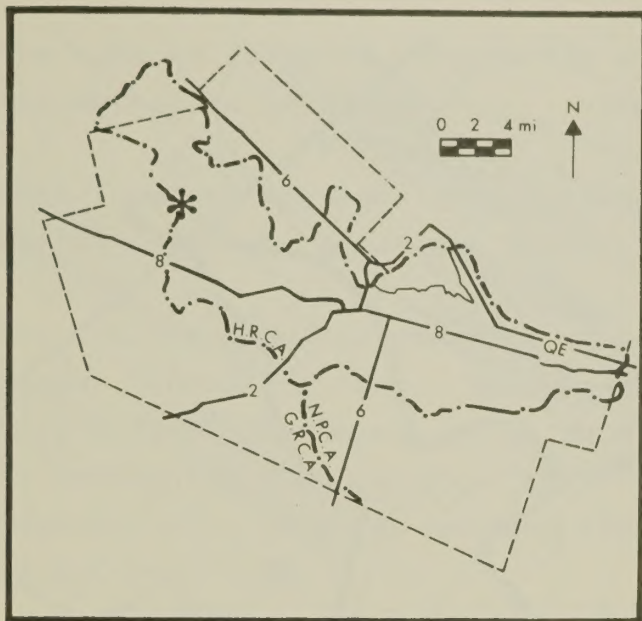
The Blacknose Shiner prefers quiet, shallow, clear bays or streams, with abundant weeds. It spawns in spring and summer. It is small (2.5 inches) and may be an important forage fish for larger species (Scott and Crossman, 1973)

Rainbow Darter (Etheostoma caeruleum)

(MNR (1975a), station 8). This small species (2 inches) is found in clear streams with gravelly bottoms, often in fairly large streams, but shallow areas are needed for spawning. It spawns in the spring. The Rainbow Darter is important as a pollution indicator, because it is extremely sensitive to chemical pollution and to silting (Scott and Crossman, 1973).

**NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS**

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION	•	
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY	•	
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT	•	
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•



NAME

Westover Wetland

CONSERVATION AUTHORITY

Grand River
Hamilton Region

CATEGORY

B

OWNERSHIP

Private

SIZE

860 acres

LOCATION

North and west of the village of Westover in Flamborough Township.

GENERAL DESCRIPTION

This is a large deciduous forested swamp with a few white cedar and white pine. A large oil pipeline, that was doubled in 1973, travels through the southern part of this forest, on the higher ground.

The western half of the swamp serves as a headwater for the Barlow Creek that flows southwest and into the Grand River drainage system. The eastern sections are headwaters for creeks that flow southeast, into the Spencer Creek.

Bedrock lies near the surface throughout most of the study area and is covered by shallow deposits, of till and lacustrine origin, 3 to 4 feet thick. Approximately 70% of the soils are muck and Farmington loam. The muck soils are poorly drained, consisting of organic deposits 12 inches or more in depth. The Farmington loam is a well-drained, shallow, soil with a depth over bedrock that does not exceed 12 inches. The other soils are the imperfectly drained London loam - shallow phase, developed on shallow loam till, and the poorly drained Toledo silt loam - shallow phase, developed on shallow lacustrine deposits. Both the two latter soils are less than 36 inches deep.

HAMILTON - WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

AREA
NO .

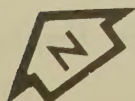
7



7

Topographic Map Reference - 40P/8a Edition 1

Military Grid Reference - 740990



0 SCALE 1 : 25,000 1 Mi

ecologistics limited

1976

The area is level to very gently sloping (0 to 2%) with some slopes approaching a 5% grade.

Well log data suggests that there may be a small, buried bedrock valley under the sensitive area.

The average specific capacity of the local wells is low and this implies a poor bedrock aquifer. Therefore, seepage of water through the organics into bedrock fractures, if it should occur, would be of minor importance in recharging the aquifer. There are no indications that the hydro-geologic relationships between the aquifer and the sensitive area are significant.

Preliminary indications are that this large, forested swamp may be significant biologically. This suggestion should be investigated by field studies.

CRITERION FULFILLED - 6

Criterion Six

Cliff Swallow (Petrochelidon pyrrhonota)

(Westover Wetland - nested in barn west of Westover General Store - Curry, pers. comm.). Highly colonial mud nests are built on cliffs, canyons and often on man-made structures such as concrete bridges and culverts. Birds then forage widely over water, marshes and open land (Godfrey, 1966). This uncommon bird, with a spotty distribution is found in three places in the Region. It is not necessarily sensitive to development.

Marsh Hawk (Circus cyaneus)

(Adult harassed observer indicating nest nearby - June 23, 1976 - Wormington, pers. comm.). The nest is placed on the ground among low bushes or other low vegetation, usually in a moist meadow or marshy place (Godfrey, 1966). This species has declined significantly, as a nesting species, in this Region in the last 40 years (North, pers. comm.).

Yellow-bellied Sapsucker (Sphyrapicus varius)

(Adult present on June 23, 1976, probably breeding - Wormington, pers. comm.). In breeding season it prefers deciduous or deciduous coniferous woodlands, particularly where poplars and birches are important components. The birds nest in a cavity excavated by the birds in a tree (Godfrey, 1966). This sight record in the middle of the breeding season probably indicates that this species is nesting here, but no nest was found.

Northern Waterthrush (Seiurus noveboracensis)

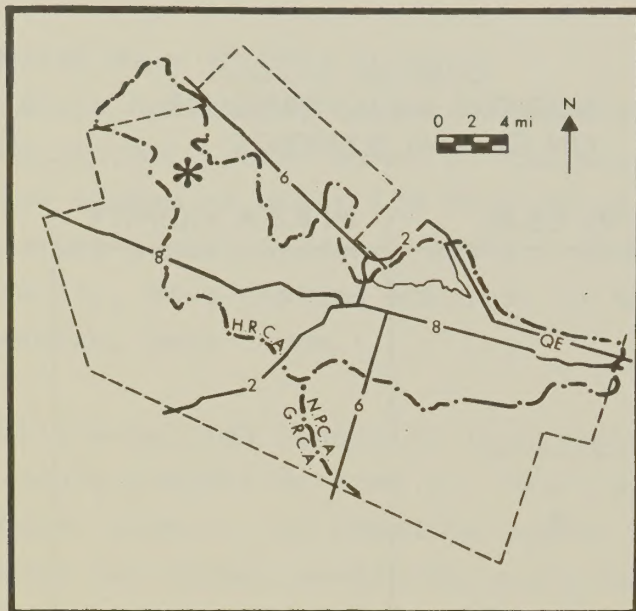
(Adult found on June 22, 1976, probably breeding - Wormington, pers. comm.). Habitat is shrubby thickets, notably alder and willow, near water along streams, ponds, and lakes, swamps, bogs, and wet parts of woodlands with shallow pools of water. Nest is placed in roots of an upturned tree, stump or bank (Godfrey, 1966). This record in the middle of the breeding season indicates that this species is probably breeding here, but no nest was found.

Swamp Sparrow (Melospiza georgiana)

(Adult found on June 23, 1976, probably breeding - Wormington, pers. comm.). Nests are placed in a tussock or marsh vegetation or low in a bush and in breeding season the bird is found in wetlands solely (Godfrey, 1966). Only four known breeding stations are known. This record in the middle of the breeding season indicates that this species is probably breeding here, but no nest was found.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•



NAME

Westover Drumlin Field

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Private

SIZE

647 acres

LOCATION

North and east of the village of Westover in Flamborough township.

GENERAL DESCRIPTION

The Westover Drumlins were formed by the action of the huge sheet of glacial ice moving across Flamborough Township, in the last ice age. The ice moved over a previously deposited moraine, and molded it into clusters of hills, each shaped like half an egg, cut lengthwise. The axes of there streamlined hills, called drumlins, roughly parallels the direction of the glacial ice flow.

As the ice melted Lake Whittlesey formed and the drumlin tops became islands in this lake. Most of the drumlins south of the Beverly Swamp show the unusual features of wave-cut terraces which were once lake beaches and are now terraces high on a hillside.

The drumlins were exposed to open water at the south and the winds drove waves against them from the open lake (Karrow, 1963). Well-sorted, angular, medium beach gravels were frequently deposited in small cones on the north side of the drumlins.

Steep slopes and the high clay content of the drumlins make conditions favourable for runoff rather than infiltration. Their groundwater recharge function is indirect in that their orientation blocks drainage, thus enabling water seepage to occur from the upstream wetland into bedrock fractures.

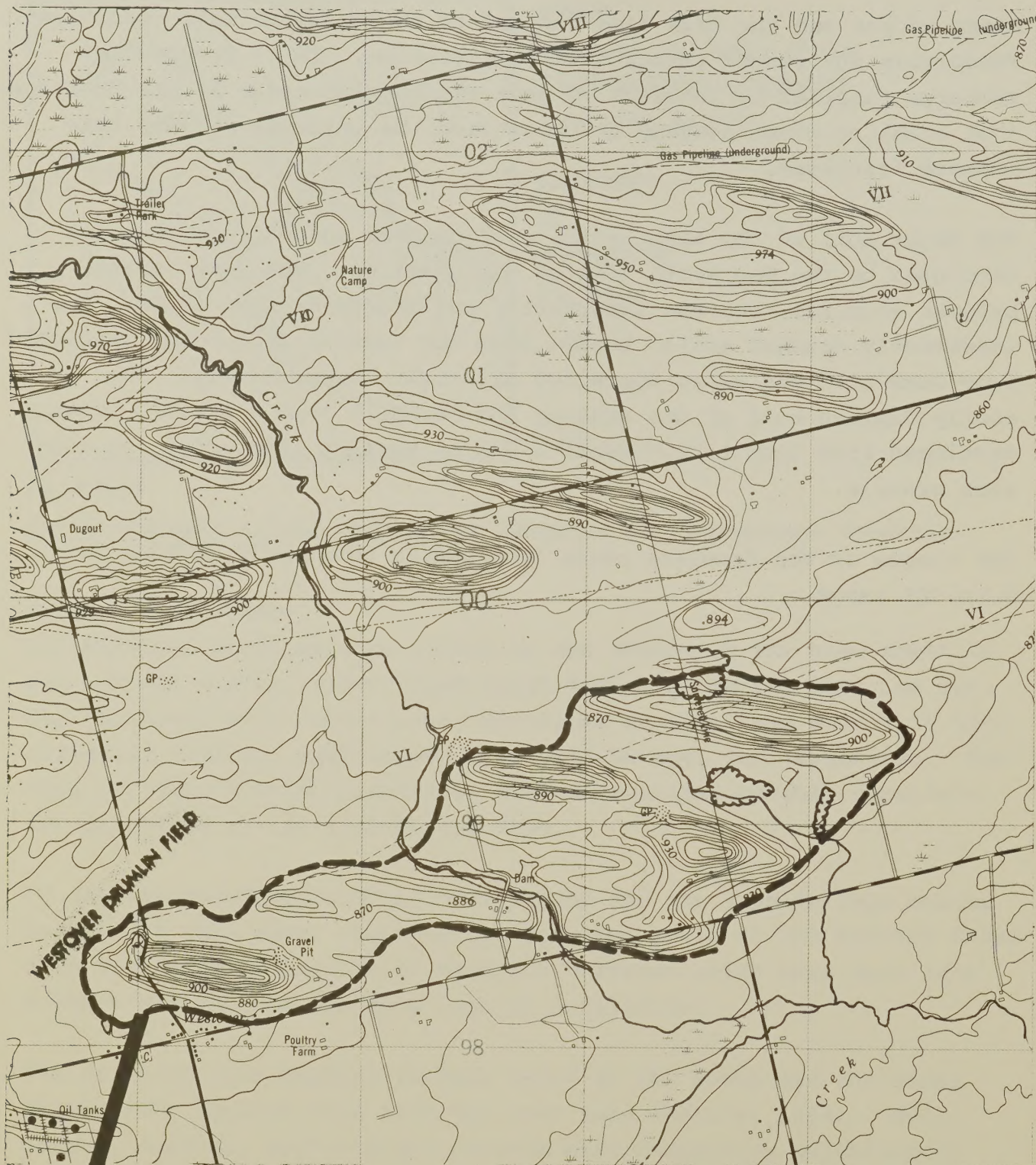
The major soil of the area is the well-drained Guelph loam that has developed on the Wentworth till of the drumlins. The lower areas, between drumlins, contain imperfectly and poorly-drained soils. The imperfectly drained soils, London loam and Tuscola silt loam, developed from loam till and water-deposited materials, respectively. The poorly drained soil of the area is the Parkhill loam - shallow phase, developed from loam till. Small areas of Burford loam occur, on outwash gravels.

The slopes of the drumlins range from gently to steeply sloping in the 5 to 30% range.

HAMILTON - WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

AREA
NO .

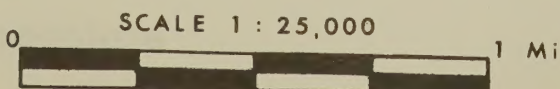
8



8

Topographic Map Reference - WESTOVER 40P/8a Edition 2

Military Grid Reference - 757988



ecologistics limited

1976

CRITERIA FULFILLED - 1 and 4

Criterion One

The Westover Drumlins fulfill the criteria for a sensitive area in that they represent a unique landform. Only the drumlins that show the unique features best, such as wave-cut terraces, are included within the boundary of the area.

The most interesting feature of the area is a tombolo bar, truncated by erosion, connecting a wave-notched drumlin to another drumlin. This is basically a sand bar that formed, due to wave and current action, between the two islands in Lake Whittlesey.

Regular farming practices are by no means destructive and provide suitable means for preserving the shorelines and bars. Careful consideration should be given to the development of the land north of this area because of its proximity to four sensitive areas and because the other drumlins in this area also show some wave-cut beaches.

Criterion Four

The Spencer Creek report (Department of Commerce and Development, 1960) classed the part of the Spencer Creek that flows through this area as cool (i.e. marginal temperatures for Brook Trout). With the Beverly Swamp immediately upstream, it is likely that water quality is still fairly good but with warmer temperatures than occur in the swamp. Cold-water streams are rare in the Region.

Several common species of fish were found in various surveys (MNR (1975b) station 5, DLF station 3, MNR (1973) station 6). They were: Central Mudminnow, Northern Redbelly Dace, Finescale Dace, Fathead Minnow, Blacknose Dace, Creek Chub, Pearl Dace, White Sucker and Brook Stickleback.

Several significant species were found.

Redside Dace (Clinostomus elongatus)

(DLF station 3, MNR (1973) station 6). The Redside Dace is a spring spawner. It prefers cool, clear streams with gravelly bottoms. It is quite sensitive to turbidity and is much less common than 30 years ago (Scott and Crossman, 1973). It is restricted, in Canada, to the clear streams flowing into western Lake Ontario and therefore is a rare Canadian fish.

It is included as one of Canada's rare and endangered species by Stewart (1974) but Crossman (pers. comm.) feels that it is not endangered but has a limited habitat and that this habitat is threatened in certain areas.

Mottled Sculpin (Cottus bairdi)

(DLF (1970) station 3). This small sculpin (3 inches long) lives in cool streams and lakes and is often associated with Brook Trout. It has been suggested that the species could be used as an indicator of waters suitable for Brook Trout, especially in southern Ontario. It spawns in the spring (Scott and Crossman, 1973).

CRITERIA FULFILLED - 1 and 4

Criterion One

The Westover Drumlins fulfill the criteria for a sensitive area in that they represent a unique landform. Only the drumlins that show the unique features best, such as wave-cut terraces, are included within the boundary of the area.

The most interesting feature of the area is a tombolo bar, truncated by erosion, connecting a wave-notched drumlin to another drumlin. This is basically a sand bar that formed, due to wave and current action, between the two islands in Lake Whittlesey.

Regular farming practices are by no means destructive and provide suitable means for preserving the shorelines and bars. Careful consideration should be given to the development of the land north of this area because of its proximity to four sensitive areas and because the other drumlins in this area also show some wave-cut beaches.

Criterion Four

The Spencer Creek report (Department of Commerce and Development, 1960) classed the part of the Spencer Creek that flows through this area as cool (i.e. marginal temperatures for Brook Trout). With the Beverly Swamp immediately upstream, it is likely that water quality is still fairly good but with warmer temperatures than occur in the swamp. Cold-water streams are rare in the Region.

Several common species of fish were found in various surveys (MNR (1975b) station 5, DLF station 3, MNR (1973) station 6). They were: Central Mudminnow, Northern Redbelly Dace, Finescale Dace, Fathead Minnow, Blacknose Dace, Creek Chub, Pearl Dace, White Sucker and Brook Stickleback.

Several significant species were found.

Redside Dace (Clinostomus elongatus)

(DLF station 3, MNR (1973) station 6). The Redside Dace is a spring spawner. It prefers cool, clear streams with gravelly bottoms. It is quite sensitive to turbidity and is much less common than 30 years ago (Scott and Crossman, 1973). It is restricted, in Canada, to the clear streams flowing into western Lake Ontario and therefore is a rare Canadian fish.

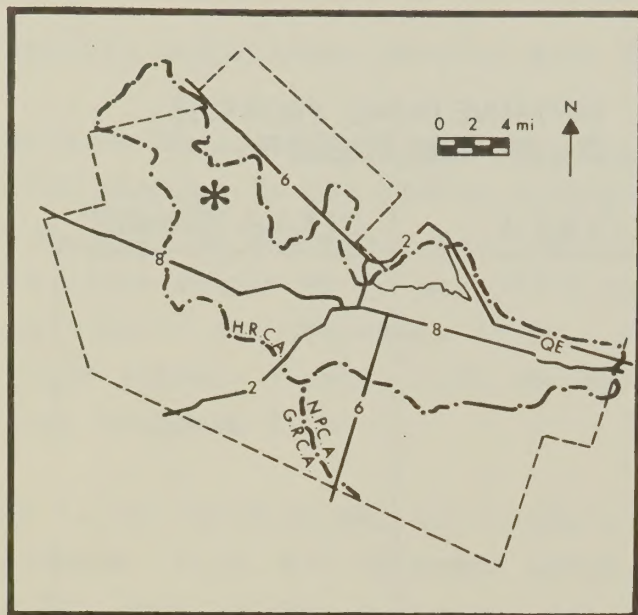
It is included as one of Canada's rare and endangered species by Stewart (1974) but Crossman (pers. comm.) feels that it is not endangered but has a limited habitat and that this habitat is threatened in certain areas.

Mottled Sculpin (Cottus bairdi)

(DLF (1970) station 3). This small sculpin (3 inches long) lives in cool streams and lakes and is often associated with Brook Trout. It has been suggested that the species could be used as an indicator of waters suitable for Brook Trout, especially in southern Ontario. It spawns in the spring (Scott and Crossman, 1973).

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE		
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	•	
AIR POLLUTION		
STREAM POLLUTION	•	•
GROUNDWATER CHANGES		
RESOURCE EXTRACTION	•	



NAME

Forestry and Wildlife Area

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Private

SIZE

1,083 acres

LOCATION

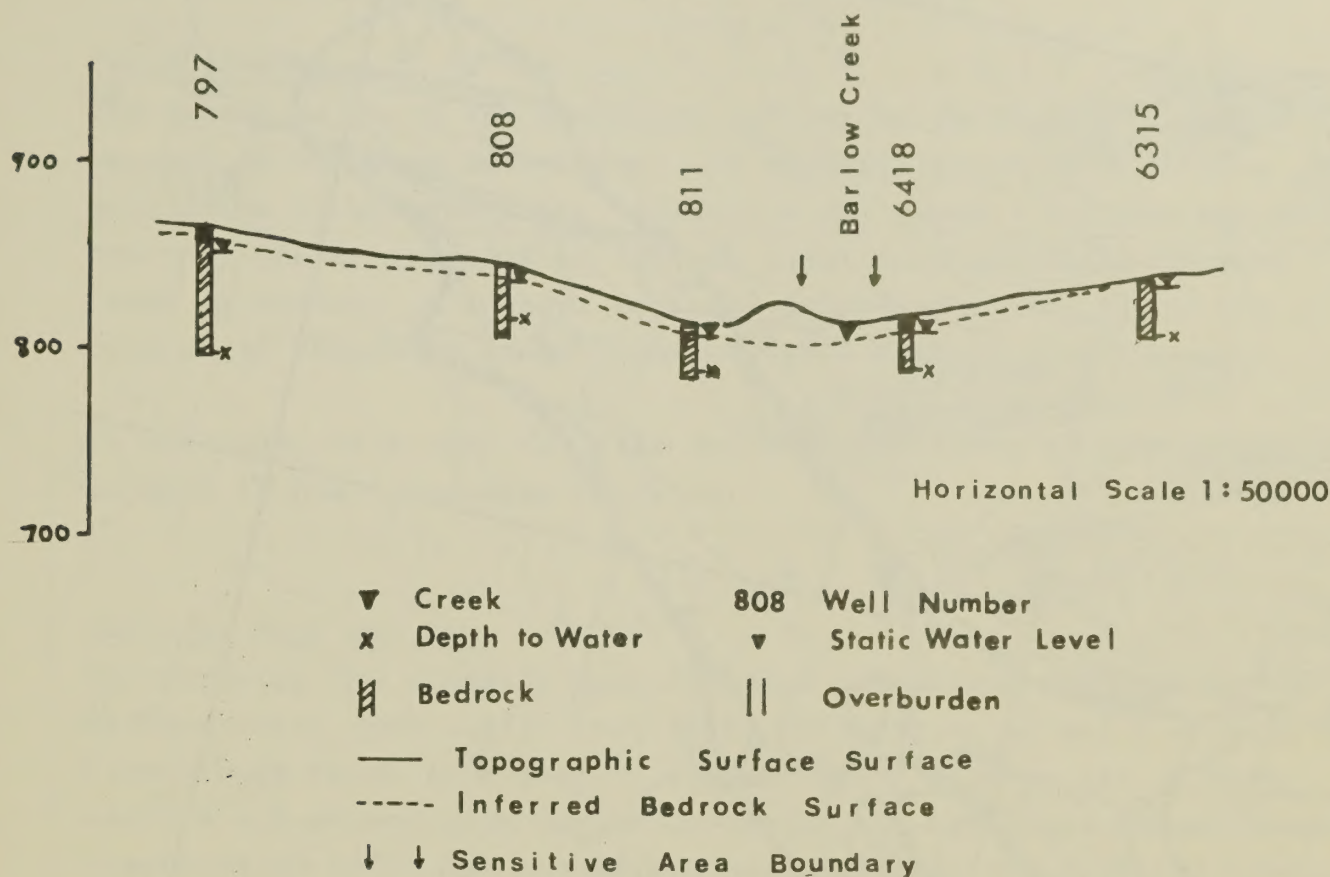
North and west of the village of Hayesland in Flamborough Township.

GENERAL DESCRIPTION

This is a large (over 1,000 acres) area of lowland swamp forest along the Spencer Creek and Flamborough Creek. Much of the forest is composed of young, woody vegetation including: white cedar, alder, red-osier dogwood, elm, soft maple and willow. In the northern sections more mature trees are found. A few small cat-tail marshes are also present.

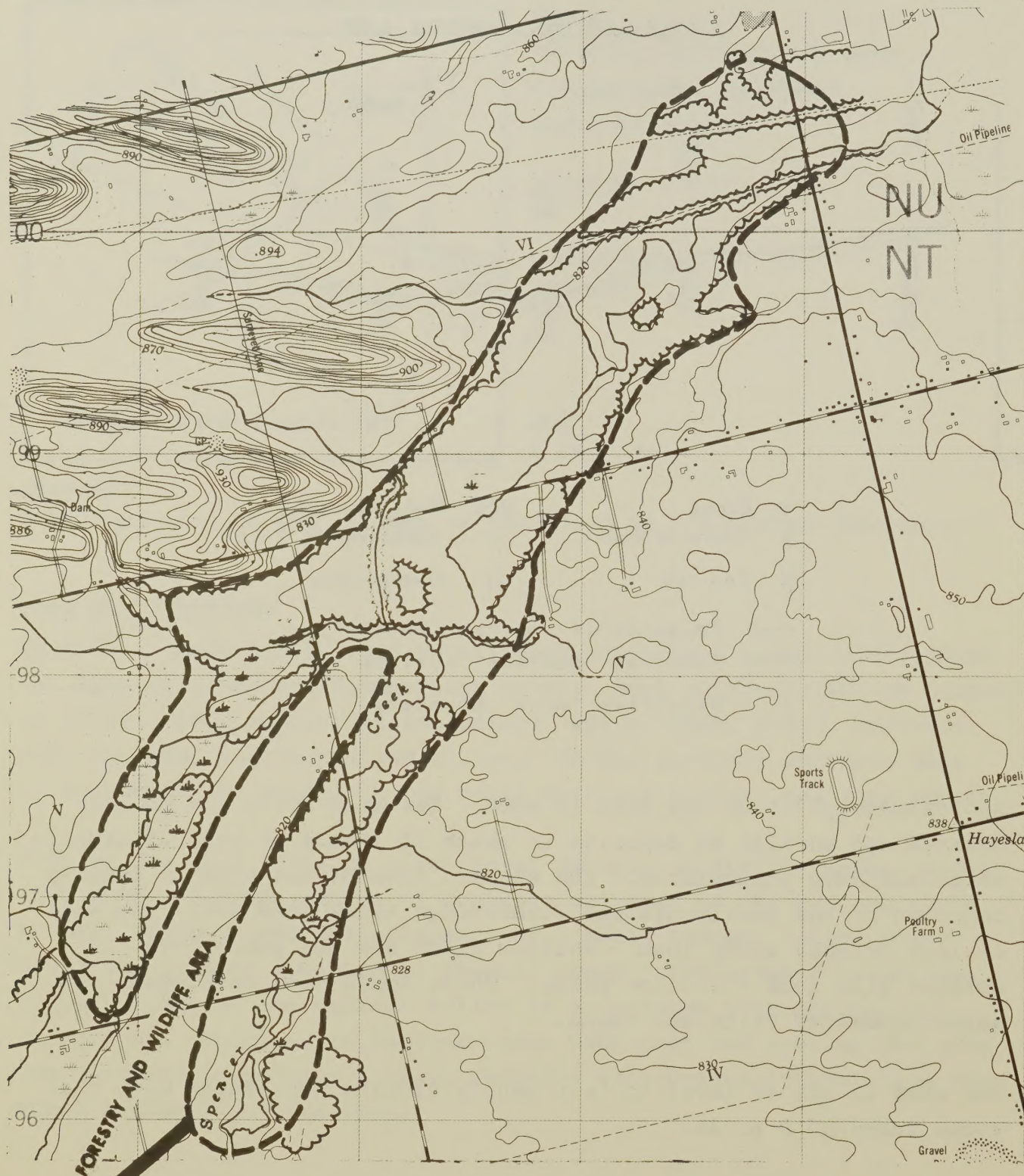
Much of the area rests on a surficial deposit of shallow water lacustrine sand. Reconstruction of drainage patterns on the bedrock topographic map suggests the existence of a small bedrock valley underlying the present location of Spencer Creek. Hydrostatic heads rise on both sides of the bedrock valley in accordance with the bedrock topography. Outcrops of bedrock occur both east and west of the area. The piezometric contour pattern suggests groundwater infiltration from these regions into the area.

CROSS-SECTION THROUGH AREA



Approximately 70% of the area is muck. The muck soils are poorly drained and consist of deposits in which 12 inches or more of organic materials have accumulated. The eastern lobe of the area is largely composed of the poorly-drained Flamborough sandy loam soil, the well-drained Grimsby sandy loam - shallow phase and the poorly-drained Colwood silt loam - shallow phase. These soils have developed from water deposited silts and sands.

The area is one of level to very gently sloping topography with the slope range of 0 to 2%.



9

Topographic Map Reference - WESTOVER 40P/8a Edition 2

Military Grid Reference - 775985



0 SCALE 1 : 25,000 1 Mi

ecologistics limited

1976

CRITERIA FULFILLED- 2, 4 and 6

Criterion Two

The actual depth of the surficial lacustrine deposits is unknown because of well log deficiency. In all likelihood considerable quantities of precipitation infiltrate the sands. Whether the main contribution to groundwater follows local discharge into Spencer Creek or whether it follows regional groundwater flow along the bedrock is unknown without detailed field work.

In any case, this area fulfills the criteria for a sensitive area in that it has a recharge function.

Criteria Four and Six

The Forestry and Wildlife Area includes 2 sampling stations on the Spencer Creek (MNR (1973) station 6, DLF station 4) and 1 station on Flamborough Creek (DLF station B, MNR (1973) station 19). These samples all showed high oxygen levels in the water and summer temperatures below 24°C, but one 23.9°C was very near the critical summer maximum. The 1960 Spencer Creek Report (Department of Commerce and Development) shows this section of Spencer Creek as cool (marginal Brook Trout temperatures) but most of Flamborough Creek (its upper portion) as cold. Thus, water quality is apparently quite good.

A number of common species were found in the area: Central Mudminnow, Northern Redbelly Dace, Finescale Dace, Fathead Minnow, Blacknose Dace, Creek Chub, Pearl Dace, White Sucker and Brook Stickleback. Some of the rarer ones were:

Brook Trout (Salvelinus fontinalis)

(Dept. of Commerce and Development (1960), MNR (1973) station 19). Just one specimen was found in MNR sampling; it is likely that more occur upstream.

The Brook Trout is a very popular and highly valued game fish in eastern Canada. It is, to most people, the most valuable fish found in the Hamilton-Wentworth Region. Spawning takes place in late summer and early fall. It inhabits "clear, cool, well-oxygenated streams and lakes" (Scott and Crossman, 1973). It is very sensitive to high temperatures and low oxygen concentrations; in fact the division between cold-water and warm-water streams is primarily based on Brook Trout requirements.

Redside Dace (Clinostomus elongatus)

(MNR (1973) station 6). Just one Redside Dace was found here.

The Redside Dace is a spring spawner. It prefers cool, clear streams with gravelly bottoms. It is "quite sensitive" (Scott and Crossman, 1973) to turbidity and is much less common than 30 years ago. It is restricted, in Canada, to the clear streams flowing into western Lake Ontario.

The Redside Dace is included as one of Canada's rare and endangered species by Stewart (1974). According to Dr. E. J. Crossman (pers. comm.), it is not endangered, but has a limited habitat, and this habitat is threatened in certain areas of Ontario.

Two very important breeding bird records come from this area.

Great Blue Heron (Ardea herodias)

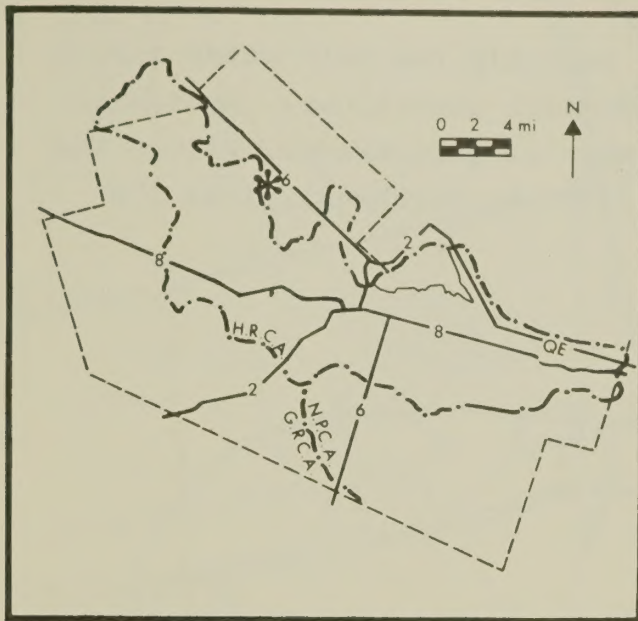
(Concession V of Beverly Township at Spencer Creek - Curry, pers. comm., 2 nests on Concession 5 - Wood Duck 22(9):114). Nests in colonies in deciduous, coniferous, and mixed woodlands which are sometimes considerable distances from water (Godfrey, 1966). The adults fly to bodies of water where fish and amphibians are caught as food for the young. The nesting colonies are very sensitive to human disturbance. Human disturbance in the nesting colony can result in severe chick mortality (Howell, pers. comm.). This is one of 2 or 3 active nesting colonies.

Saw-whet Owl (Aegolius acadicus)

(Photographed in a nest box several years ago by Leonard Zorn on his property near Spencer Creek on the 5th Concession - Dowall, pers. comm.). The nests are found in old woodpecker holes or other cavities in trees. The habitat is coniferous and deciduous woodlands, especially wetter ones; also dense alder thickets and cedar and tamarack bogs (Godfrey, 1966). This is the only known Regional nesting station and the record is important because it indicates that this secretive species may nest in the lowland woods of this area.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION	•	
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY	•	
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT	•	
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•



NAME

Hayesland Forestry and Wildlife Area

CONSERVATION AUTHORITY

On the boundary between the Hamilton
Halton Authorities

CATEGORY

B

OWNERSHIP

Private

SIZE

1,517 acres

LOCATION

Centered between Harper's Corners on Highway 6 and the village of
Hayesland on the Brock Road, in Flamborough Township.

GENERAL DESCRIPTION

A very large forested swamp such as this one, with an area of over
1,500 acres is important for forestry and wildlife purposes. It is
actually two large forests divided by some higher ground on which
numerous country homes have been built. Many sections of the maple
swamp contain good sized trees. Some areas of aspen and black willow
are more shrubby in nature.

Much of the swamp is underlain by lacustrine and outwash sands.
Organic muck soils are found on 80% of the surface and the remainder
consists of soils that are members of the Grimby Catena. These soils
are the well-drained Grimsby sandy loam, imperfectly-drained Vineland
sandy loam and the poorly-drained Flamborough sandy loam. They have
developed from water-deposited fine and medium sands.

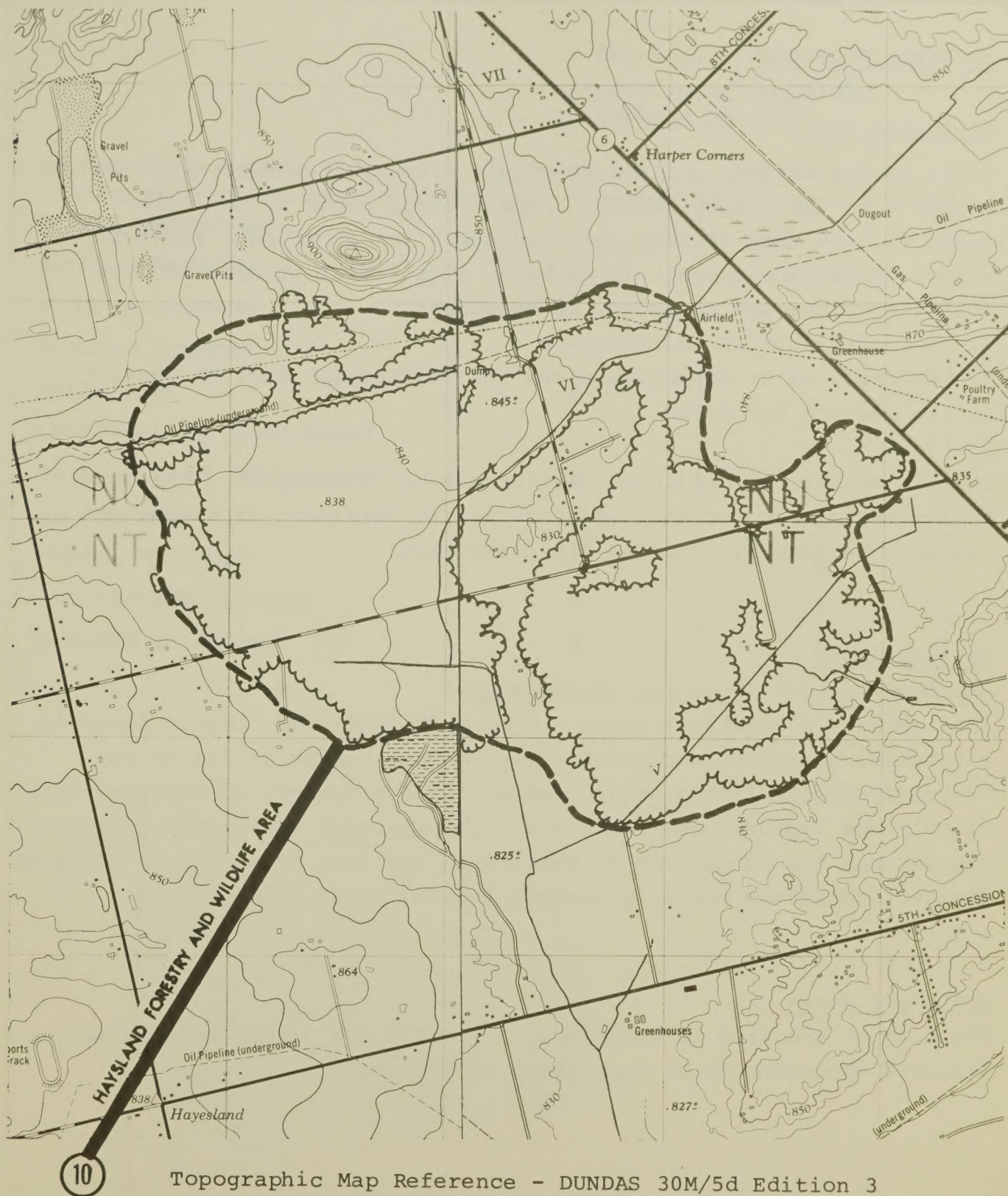
The better drained soils occur in the centre of the area, with slopes
in the 2 to 5% range, but the rest is flat.

Water is found at depths greater than 10 feet into bedrock and there-
fore it is doubtful that groundwater is discharging into the area.

Runoff from the surrounding hills is probably the main water supply component that is sustaining the moist soil conditions. Hydraulic gradients suggest a rather slow movement of groundwater, within the bedrock at depth, from the west and from the northwest, into the sensitive area.

HAMILTON - WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

AREA
NO . **10**



CRITERIA FULFILLED - 2, 6 and 7

Criterion Two

Wells in the eastern portion penetrate black, bituminous shale and dolomite of the Eramosa Member. The average depth to the water-table is less than 20 feet into bedrock. The overlying, surficial, sandy, lacustrine deposit is probably significant in allowing the following processes to occur, in sequence:

- 1) Moderate initial infiltration
- 2) Moderate water migration along the overburden- bedrock contact to bedrock fractures.

In this manner, the regional aquifer can be "recharged". The quantitative estimation for this infiltration is difficult to assess and can only be done by detailed field research.

Criterion Six

American Bittern (Botaurus lentiginosus)

(Millgrove - 2 adults, 3 young - Wood Duck 19(2):21). Nests found in cat-tails, bulrushes and similar vegetation: occasionally in dry fields (Godfrey, 1966). Only common in large freshwater marshes. One of only two Regional nesting areas. The scarcity of this species reflects upon the large loss of habitat in the last 50 years due to marsh destruction around Hamilton Harbour (North, pers. comm.).

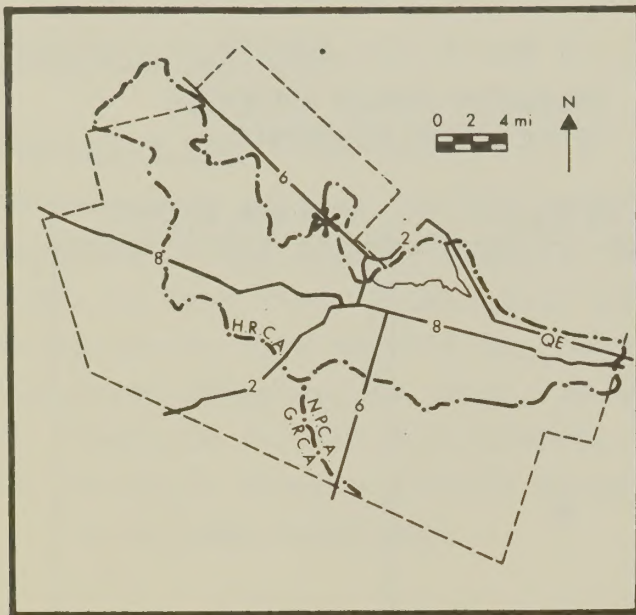
Criterion Seven

The size of the area is considerable (over 1,500 acres) with large sections appearing to be relatively undisturbed.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•





NAME

Millgrove Woodlot

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Private

SIZE

189 acres

LOCATION

South of the village of Millgrove in Flamborough Township.

GENERAL DESCRIPTION

Most of the area is a good upland maple - beech woodlot, with some lowland forest areas. Much of the surrounding cleared land is dotted with rural homes and several new ones are located in the woodlot itself.

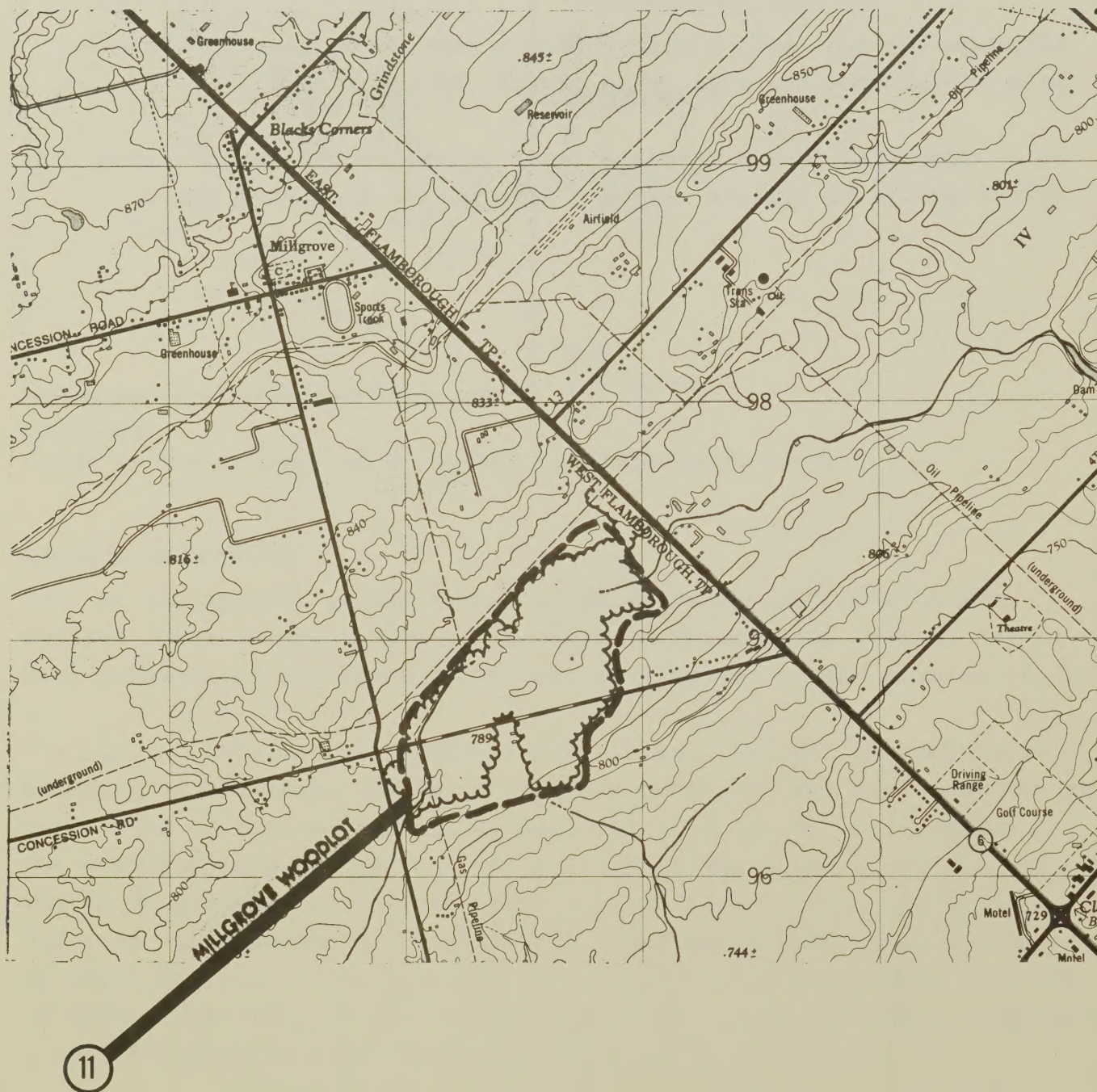
The contact between two layers of bedrock lies beneath the surficial material of the area. Wells to the east penetrate the grey and grayish-brown fine to medium crystalline Goat Island dolomite, while wells to the west encounter a few feet of the Eramosa shale overlying the dolomite. The fresh groundwater is found between 0 and 6 feet into the dolomite. The best water producing condition is found where bedrock is confined by overlying clay. The specific capacities of the wells vary from low to high. The slope of the hydraulic gradient is to the south, suggesting a moderate flow in that direction.

Much of the surficial material is sand of lacustrine and outwash origin. The southern portion of the area has a muck soil, which is organic matter at least 12 inches deep. The other soils include the poorly-drained Flamborough sandy loam and the well-drained Grimsby sandy loam. Both of these soils have developed from water-deposited sand.

Most of the area is level with a slope from 0 to 2 percent, but the better drained sections to the north have slightly steeper slopes.

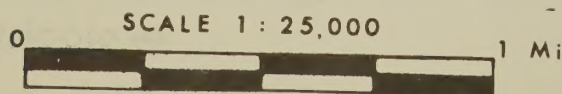
Although sections of the area probably have high water infiltration into the bedrock its small size limits its importance.

It is essential that a complete field survey be conducted through the summer months to fill in the many information gaps that exist.



Topographic Map Reference - DUNDAS 30M/5d Edition 3

Military Grid Reference - 855968



ecologistics limited

1976

CRITERION FULFILLED - 6

Criterion Six

It is reported that Ebony Spleenwort (Asplenium platyneuron) occurs in this woods (North, pers. comm.). This is a rare fern that grows in open woods, wooded slopes, rocky banks or crevices of ledges (Fernald, 1970).

Upland Sandpiper (Bartramia longicauda)

(Millgrove - Woods, pers. comm.; Shivas, pers. comm.). Nests in a depression on the ground in open grassy uplands: hayfields, pastures and prairies (Godfrey, 1966). Excessive shooting, for the commercial market in the last century, reduced this birds' numbers to a low ebb, from which it has never recovered (Bent, 1928). Three Regional stations known but may be found elsewhere in old, abandoned fields.

Alder Flycatcher (Empidonax alnorum)

(Nest with 4 eggs found June 22, 1976 - Wormington, pers. comm.). This species nests in shrubbery which is usually in areas of standing or flowing water (Godfrey, 1966). This is the first nest found in this Region and only one of two areas where this species breeds.

Blue-gray Gnatcatcher (Polioptila caerulea)

(Found in the height of breeding season - June 22, 1976 - Wormington pers. comm.). The small nest is saddled on a limb or placed in the fork of a branch anywhere from 10 to 60 feet above the ground, but usually quite high. It is found most often well up in mature trees, but may be found also in low thickets and small growth (Godfrey, 1966). An uncommon southern bird that is found in only 3 stations.

Chestnut-sided Warbler (Dendroica pensylvanica)

(Found in height of breeding season - June 22, 1976 - Wormington, pers. comm.). Preferred habitat is open bushy second growth and thickets deciduous, on both dry and moist ground. Nests are placed in sapling, low bush or vine, usually 1 to 3 feet up (Godfrey, 1966). One of only three breeding areas.

Mourning Warbler (Oporornis philadelphia)

(Found in height of breeding season - June 22, 1976 - Wormington, pers. comm.). The ground nest is placed in tangles of briery shrubs or other low vegetation. Habitat is shrubbery and bushes of young second growth on burntlands and clearings; woodland edges and sunny openings; margins of bogs and marshes (Godfrey, 1966). This uncommon warbler of lowland, open forests is found in only 5 areas in the Region.

White-throated Sparrow (Zonotrichia albicollis)

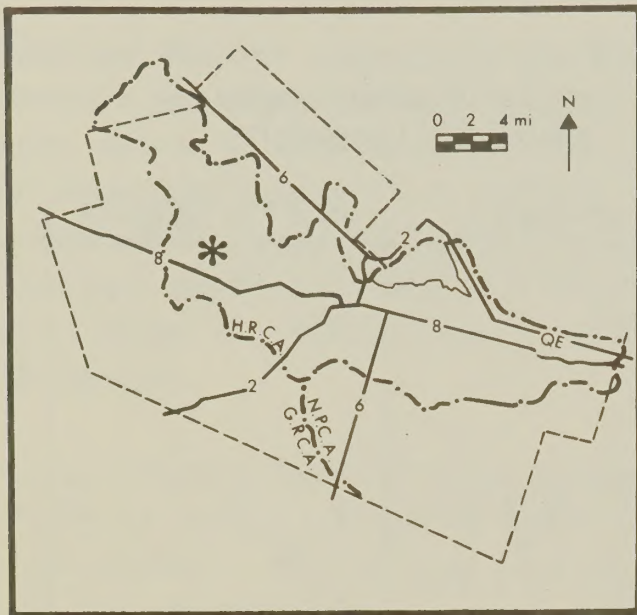
(Found in height of breeding season - June 22, 1976 - Wormington, pers. comm.). This ground nesting bird is found in a variety of habitats through most of its range (Godfrey, 1966). In southern Ontario it most often breeds in open swamps. This species is a hypothetical nester in the Region as no nests have been found, but it likely breeds here.

Swamp Sparrow (Melospiza georgiana)

(Found in height of breeding season - June 22, 1976 - Wormington, pers. comm.). Nests are placed in a tussock of marsh vegetation or low in a bush and in breeding season the bird is found in wetlands solely (Godfrey, 1966). Only five breeding stations are known in the Region. Is this bird really this rare?

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	•	
AIR POLLUTION	•	
STREAM POLLUTION	•	
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•



NAME

Donald Farm Wetland

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Private

SIZE

223 acres

LOCATION

North of Peter's Corners along the Spencer Creek, in Flamborough Township.

GENERAL DESCRIPTION

The area is a mixture of lowland, wet forest and upland deciduous forest. The Spencer Creek flows through the forest in this area and joins with the Westover Creek.

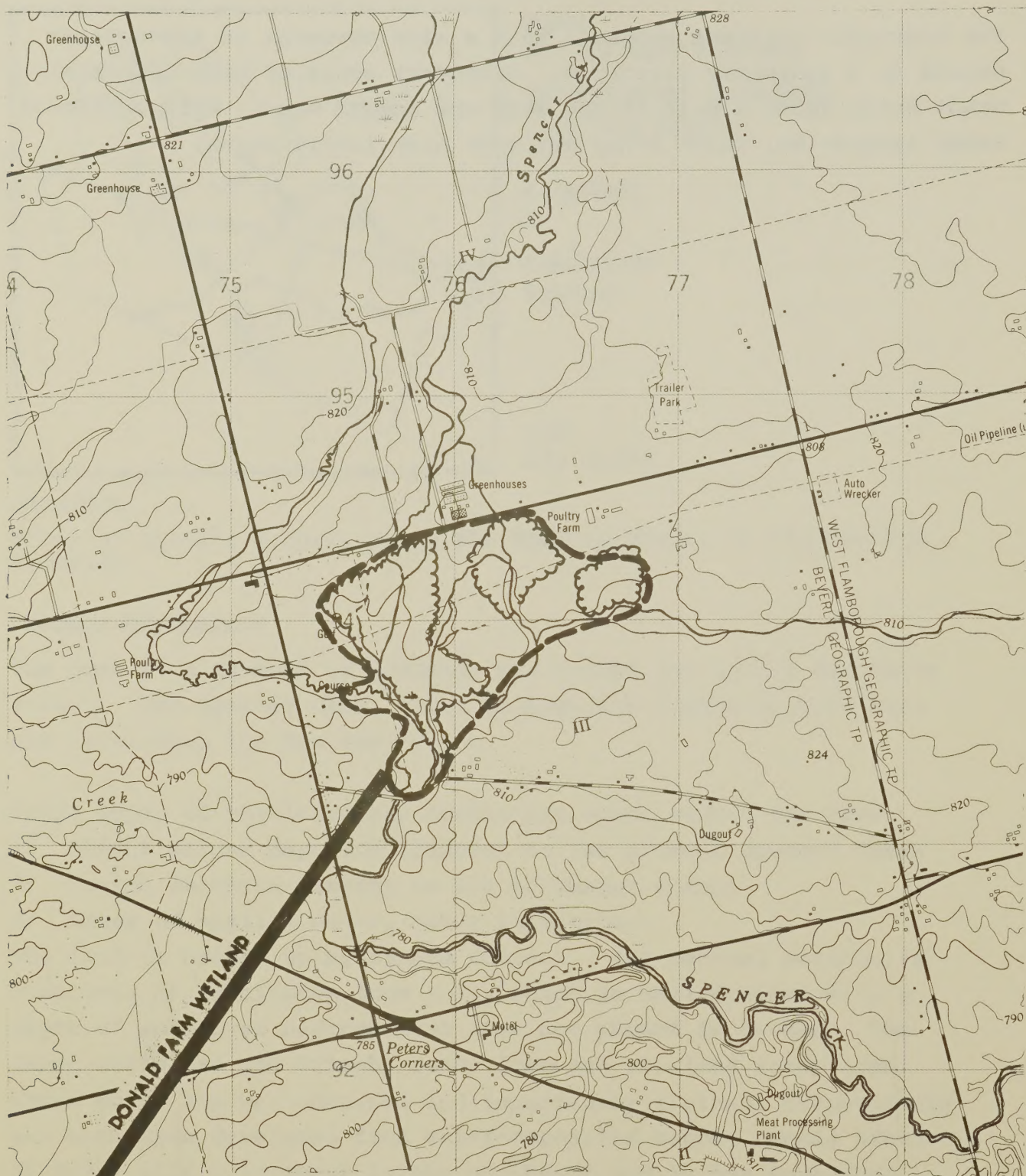
Three types of physiographic conditions occur within the area:

- 1) Recent stream deposits adjacent to the present Spencer Creek
- 2) Guelph dolomite outcrop in the northeast corner
- 3) Areas of shallow water, sandy lacustrine.

The land is broken up by stream courses. The central portion is comprised of Farmington loam soil, which is well-drained with a depth of soil over bedrock that does not exceed 12 inches. The other soils are the Grimsby sandy loam and Vineland sandy loam. These soils are well-drained and imperfectly-drained, respectively and both have developed from water-deposited sands. Small areas of Brant silt loam occur in the northeast and it has developed from water-deposited silt loam and fine sandy loam.

Most of the area is flat with slopes in the 0 to 2% range but between the stream courses slopes of 5% occur.

The hydraulic gradient suggests that a slow movement of groundwater occurs in a southerly direction. Secondary zones of high hydrostatic heads exist about a mile to the east and to the west. With surficial sandy lacustrine, these zones may have high infiltration.



12

Topographic Map Reference - WESTOVER 40P/8a Edition 2

Military Grid Reference - 760940



SCALE 1 : 25,000

1 Mi

ecologistics limited

1976

CRITERION FULFILLED - 4

Criterion Four

Spencer Creek was sampled twice in recent years (DLF station 5, MNR (1973) station 5). Westover Creek was sampled twice (DLF station C, MNR (1973) station 18). The resulting data showed that the creeks have low summer temperatures and high oxygen levels. This supports the Spencer Creek Report (Department of Commerce and Development, 1960) that designated this section of Spencer Creek as having cool waters.

Therefore water quality appears to be quite good with the possibility of warm summer temperatures occurring.

A large number of fish species are found in this part of Spencer Creek. The more common ones include: Central Mudminnow, Northern Redbelly Dace, Fathead Minnow, Blacknose Dace, Creek Chub, White Sucker, Pearl Dace and Brook Stickleback. The more significant species include:

Redside Dace (Clinostomus elongatus)

(DLF station 5, MNR (1973) stations 5 and 18). The Redside Dace is a spring spawner. It prefers cool, clear streams with gravelly bottoms. It is quite sensitive to turbidity and therefore will be found less and less often in the future (Scott and Crossman, 1973). It is included as one of Canada's rare or endangered species by Steward (1974) but according to Dr. Crossman (Pers. comm.) it is not endangered, but has a limited habitat that is threatened now in certain areas of Ontario.

Northern Hog Sucker (Hypentelium nigricans)

(MNR (1973) station 5). This is an unusual sucker that inhabits riffles of warm, clear streams. Most suckers stay in deeper, slower water. It is a spring spawner (Scott and Crossman, 1973).

Green Sunfish (Lepomis cyanelus)

(MNR (1973) station 5). This location in Spencer Creek is east of the normal Ontario distribution. It is found in a variety of habitats but is usually in the shallows of moderate-sized lakes. It is quite tolerant of turbidity, more so than other Canadian sunfishes. Spawning takes place in late spring and early summer (Scott and Crossman, 1973).

Largemouth Bass (Micropterus salmoides)

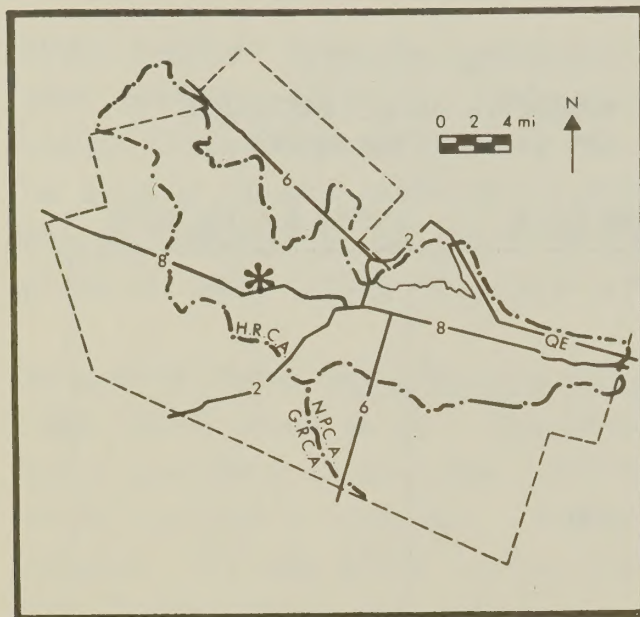
(MNR (1973) station 5). The presence of largemouth bass, a known warm-water species, at the same station as mottled sculpin, a known cold-water species is unusual. It may indicate an increase in temperature between 1970 and 1973, or the location of the Wetland in a marginal area between warm and cold water sections of the stream.

Mottled Sculpin (Cottus bairdi)

(DLF station 5). This small sculpin (3 inches) lives in cool streams and lakes and is often associated with brook trout. It may be an indicator of waters that are suitable for brook trout. It spawns in the spring (Scott and Crossman, 1973).

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●



NAME

Christie Conservation Area

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Public

(Hamilton Region Conservation Authority)

SIZE

792 acres

LOCATION

In the southern part of Flamborough Township between Highways 5 and 8.

GENERAL DESCRIPTION

Most of the area is the flood plain and associated back-river banks of the Spencer Creek. Much of the land has been cleared in the past for agricultural purposes but is now reverting to forest due to Conservation Authority planting and natural ecological succession.

The creek is the major feature, with the valley floor covered by alluvial deposits and bedrock exposed in places. To the north and south the surficial materials are sand of lacustrine and outwash origin. South of the creek occurs a soil complex of Grimsby sandy loam and Brant silt loam. Both soils are well-drained with the Grimsby soils developed from sands and the Brant soils from silt loam and fine silt loam. North of the creek occurs the well-drained Springvale sandy loam developed from sand over outwash gravels and the Beverly silt loam-shallow phase. This latter soil is imperfectly drained and developed from lacustrine clays and silts.

Overall, the regional aquifer is not very productive. Highest water yields occur from the sandy lacustrine area found north of the sensitive area. The southerly moving flow of groundwater swings to the

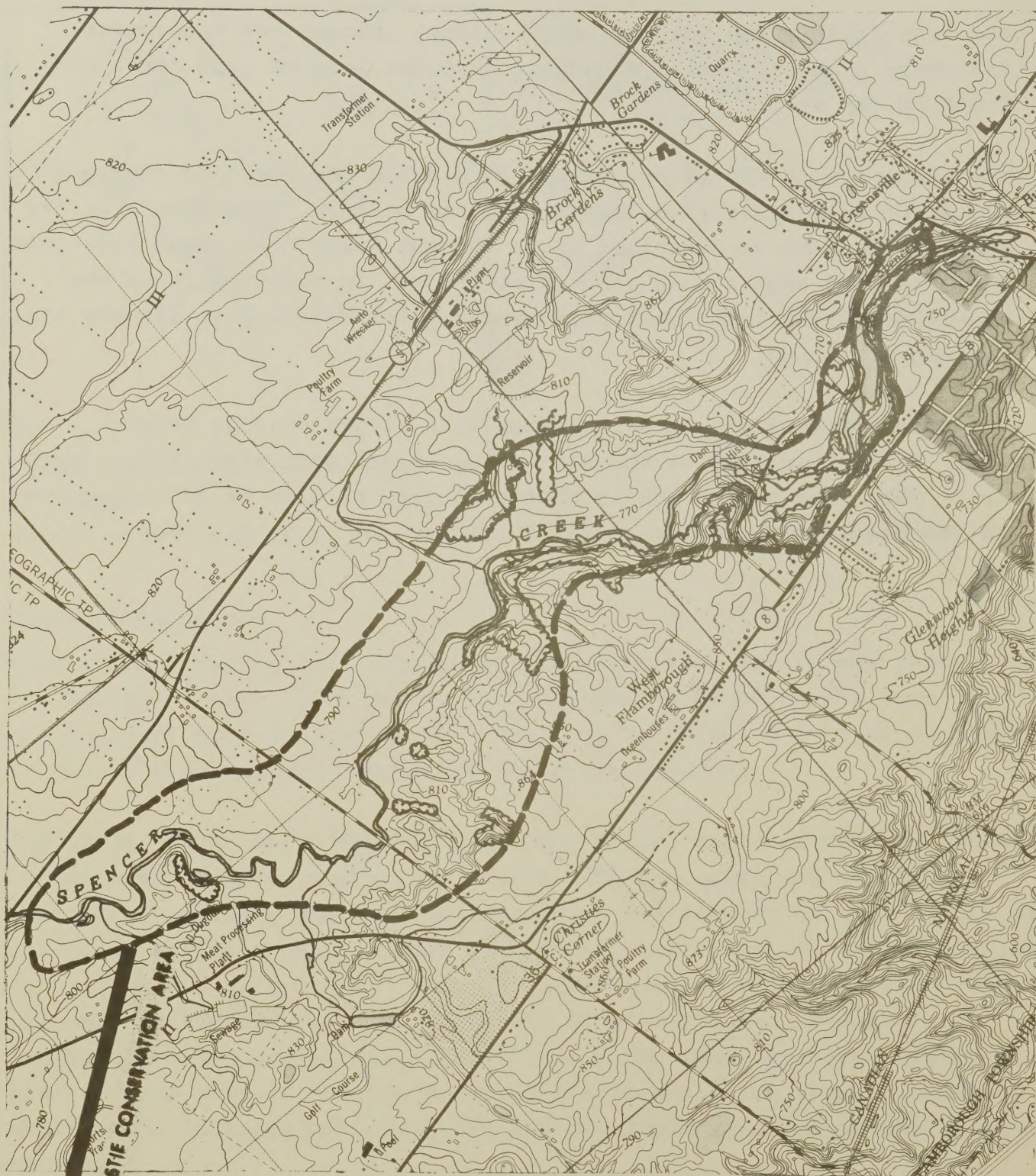
ecologistics limited

1976

east and follows the Spencer Creek channel through the escarpment. Secondary areas of high hydrostatic head are located just north and south of the area.

The proximity of the river channel to bedrock may serve to create a situation where river water moves into the bedrock. The fact that the water table lies at depths of 20 to 40 feet below the stream elevation suggests that such a condition is possible. In all likelihood the magnitude of the infiltration is probably insufficient to serve a major recharge function.

The south bank of the creek is steep with slopes ranging between 5 and 15%. In the vicinity of the dam the banks are very steep with slopes up to 30%. The north bank is gently sloping at 2 to 5% and increases in steepness to the east.

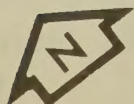


13

CHRISTIE CONSERVATION AREA

Topographic Map Reference - WESTOVER 40P/8a Edition 2
DUNDAS 30M/5d Edition 3

Military Grid Reference - 795923



0 SCALE 1 : 25,000 1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 3, 6 and 8

Criterion Three

Water quality data is available for 4 sites within the Conservation Area (DFL station 6, MNR (1973) station 4; DFL station 7; MOE Crooks Hollow station; MNR (1973) station 3). Together the samples show occasional summer temperatures of 24°C or more and occasional dissolved oxygen concentrations as low as 5 mg/l. This indicates fair water quality.

The fish species present, illustrate the increase in size of the creek, from upstream areas.

Some of the species found include: Northern Redbelly Dace, Mirror Carp, Common Shiner, Fathead Minnow, Blacknose Dace, Creek Chub, White Sucker and Northern Hog Sucker.

Some interesting indicator species were:

River Chub (Nocomis micropogon)

(MNR (1973) station 3). The River Chub requires clear, clean water and gravel bottoms but prefers rivers to creeks. It is larger than most minnows, averaging 4 inches in length. It is a spring spawner (Scott and Crossman, 1973).

Longnose Dace (Rhinichthys cataractae)

(MNR (1973) station 3). The Longnose Dace is usually found in clean, swift streams or near the edges of clear lakes, over gravel bottoms. It is small, averaging 3 inches in length. It spawns in spring and early summer (Scott and Crossman, 1973).

Redside Dace (Clinostomus elongatus)

(DLF (1970) station 6). The Redside Dace is a spring spawner. It prefers cool, clear streams with gravelly bottoms. It is "quite sensitive" (Scott and Crossman, 1973) to turbidity, and therefore

will be found less and less often in the future. It is small, averaging 3 inches

The Redside Dace is limited in Canada to the clear streams flowing into the west end of Lake Ontario. It is included as one of Canada's rare or endangered species by Steward (1974). According to Dr. E. J. Crossman (pers. comm.), it is not endangered, but has a limited habitat, and this habitat is threatened in certain areas of Ontario.

Smallmouth Bass (Micropterus dolomieu)

(MNR (1973) station 3). This species spawns in the late spring and early summer. It is found in lakes and rivers in fairly shallow water, near the shelter of rocks or logs. It prefers lower temperatures than the Largemouth Bass and is a very important fish for sport fishing (Scott and Crossman, 1973).

Largemouth Bass (Micropterus salmoides)

(MNR (1973) station 4). The Conservation Area sampling found one Largemouth Bass only but there may be a large number in the area as the Ministry of Natural Resources describes the areas as having "angling opportunities for Largemouth Bass". It spawns from late spring to mid-summer, and is an important sport fish (Scott and Crossman, 1973).

Criterion Six

It is reported that the very rare Sweet Chestnut (Castanea dentata) grows here. At least one tree of 8 inches in diameter is known (Laing, pers. comm.). The tree was once common in eastern North America but was almost completely wiped out by a fungus disease at the beginning of this century.

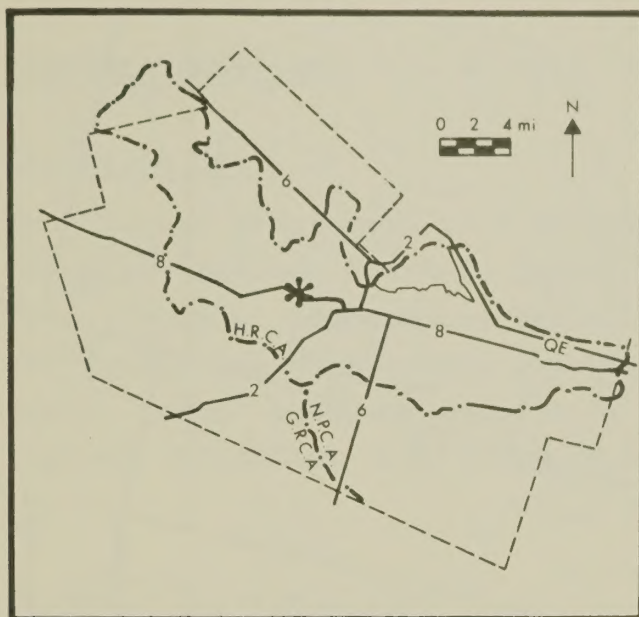
Criterion Eight

The area is particularly suitable for conservation education purposes because of its proximity to the urban areas and therefore in proximity to the public and high schools. Many areas of the Conservation Area are suitable for the use of large numbers of students, on educationally oriented field trips.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE		
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

The steep slopes of the area are potential erosion problems. The tributary creeks are already quite deeply incised into the Spencer Creek banks. Disturbance of the valley sides may lead to sedimentation of the creek and may affect the holding capacity of the reservoir.



NAME

Spencer Gorge
(Webster's and Tew's Falls)

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

A

OWNERSHIP

Mostly public (Hamilton Region
Conservation Authority) with
some Private

SIZE

290 acres

LOCATION

In the Niagara Escarpment on the northern edge of the city of Dundas.

GENERAL DESCRIPTION

The west branch of Spencer Creek falls over the Niagara Escarpment to form Webster's Falls. The east branch of Spencer Creek falls over the Niagara Escarpment to form Tew's Falls. The rivers join just below their falls and flow through a deep gorge that leads to the Dundas Valley and the city of Dundas.

The gorge and the surrounding escarpment banks are heavily forested and produce a very beautiful scenic view.

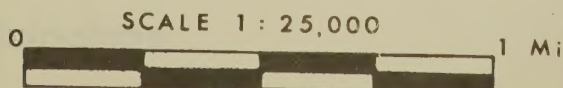
Groundwater is chiefly found in the bedding planes and fractures in the dolomite bedrock. There is no evidence for the existence of preglacial or periglacial bedrock valleys, for the groundwater to follow. It simply flows in a southeastern direction as does the bedrock topography.



14

Topographic Map Reference - DUNDAS 30M/5d Edition 3

Military Grid Reference - 832917



ecologistics limited

1976

CRITERIA FULFILLED - 1, 3, 5, 6, 8 and 9

Criterion One

The Niagara Escarpment is a unique geological landform extending over 380 miles through southern Ontario. In the Hamilton area, it is present as a prominent topographic bedrock feature with a vertical drop of over 200 feet. The most common expression of the escarpment in the mantled scarp, formed as a consequence of differential erosion of resistant caprock and softer underlying rocks.

Criteria Three and Five

The International Biological Program found the following plant communities: dry-mesic, semiclosed escarpment rim mixed forest, wet-mesic open dropping cliff-face, mesic semiclosed slope forest, wet-mesic, closed, mixed, valley-basin, forest and old fields. The moist habitat created in the deep valley has led to a lush plant growth with many ferns (Bryant, Wood Duck 24(4):46).

The presence of many rare plants indicate that the biological communities that occur there are of high enough quality to provide the precise ecological requirements required by the plants. Some of the unique plants include: Walking Fern (Camptosorus rhizophyllus) (Clark, Wood Duck 5 (1):8; Miller, Wood Duck 11(1):2; McLaren, pers. comm.), Fringed Gentian (Gentiana crinita) (McLaren, pers. comm.), Tall Bellflower (Campanula americana) (McLaren, pers. comm.), Moonseed (Menispermum canadense), White Lettuce (Prenanthes alba) (Lewarne, Wood Duck 17(2):19), Huckleberry (Gaylussacia baccata) and Milk Vetch (Astragalus canadensis) (Lamb, herbarium specimens U. of W.), Perfoliate Bellwort (Uvularia perfoliata) (Pringle, pers. comm.), and Purple Rock Clematis (Clematis occidentalis) (Shivas, pers. comm.).

The quality of the environment is also indicated by the presence of creatures such as:

Masked Shrew (Sorex cinereus cinereus)

(Warren, Prince and Henderson MS). Base of rocky slopes in mixed forest. High humidity and heavy, wet ground cover are some requirements (Banfield 1974, 9). Common throughout Ontario but more sparingly distributed in extreme south.

Northern Water Snake (Natrix sipedon sipedon)

(Martin 1950). A refuge for this fairly common but much-persecuted and often locally-eliminated snake.

Criterion Six

Smoky Shrew (Sorex fumeus fumeus)

(Warren, Prince and Henderson MS; ROM #32641, 32642). At base of talus - mossy rocks along streams in mature forest a favoured habitat (Banfield 1974, 17). Seldom recorded in extreme southwest of province and along Lake Erie (Peterson 1966, 37).

Louisiana Waterthrush (Seiurus motacilla)

(Tew's Falls - Nest with 1 young - Wood Duck 24(3):37, Nest with 4 eggs - Wood Duck 13(1):19, found here through summer - Wormington pers. comm.). (Webster's Falls - Wood Duck 13(1):19, Wood Duck 16(3):54, Dowall - Wood Duck 8(9):6). The bird requires undisturbed natural forests that contain a fast flowing river or stream in a deep ravine or a mountainous condition, for its breeding habitat (Godfrey, 1966, C. Woods, pers. comm.). Therefore it is found in our area where streams pour over the Niagara Escarpment into wooded gorges. We know of 10 breeding stations for this species in Canada of which five are in this Region (Wormington, pers. comm.). These stations are: 3 escarpment areas in Halton County (Wormington, pers. comm.), 1 escarpment falls in the Niagara Region (Meyers, pers. comm.) and 1 area near London, Ontario (Godfrey, 1966). Therefore half of the known Canadian breeding areas are in the Hamilton-Wentworth Region.

Criterion Eight

Spencer gorge has an important educational role with respect to geology. Walking a transect from the top of the escarpment to the railroad tracks, one can find interesting outcrops of Silurian rocks. The Whirpool sandstone, a basal grey orthoquartzite formed by tidal and subtidal processes is particularly well exposed here. The presence, thickness and orientation of the individual rock units vary considerably from place to place due to the lithologically heterogeneous nature of the Silurian System.

The break in the escarpment, known as the Spencer Gorge, is related to post-glacial erosion. It extends back about one-half mile into the escarpment, exposing the various Silurian rock layers.

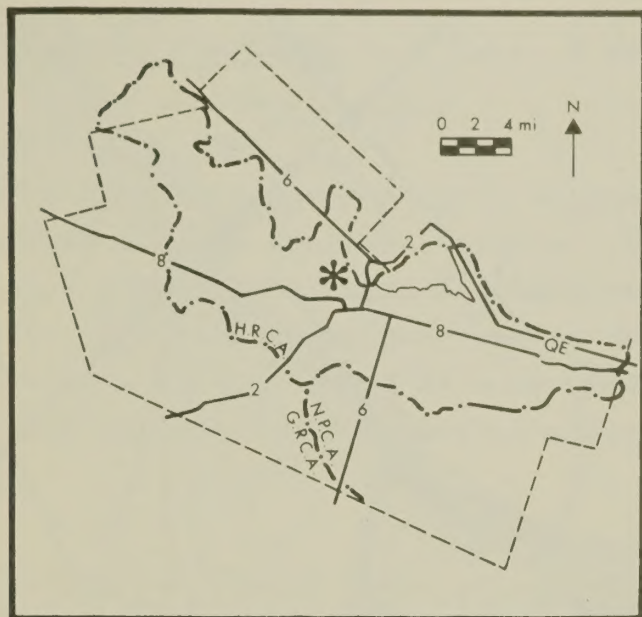
Criterion Nine

This rugged picturesque area of the Niagara Escarpment offers many spectacular scenic qualities. The combination of the Dundas Peak, Tew's Falls and the Gorge below both Tew's and Webster's Falls produces a beautiful, wild setting.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION	●	
ACTIVE RECREATION	●	
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY	●	
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT	●	
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

The slopes of the area are extremely steep and are now covered by vegetation. Disturbance of this vegetation could result in erosional problems, particularly where the weathered Queenstone shale is exposed. Sedimentation problems could then occur in downstream sensitive areas.



NAME

Borer's Falls - Rock Chapel

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

A

OWNERSHIP

Mostly Public (Hamilton Region Conservation Authority and Royal Botanical Gardens) and some Private

SIZE

600 acres

LOCATION

Part of the Niagara Escarpment between the Town of Dundas and Flamborough Township.

GENERAL DESCRIPTION

Borer's Creek tumbles over the Niagara Escarpment into a deep, forested gorge creating Borer's Falls. A smaller creek creates its own waterfall. The combinations of scenic beauty, an old natural upland forest, deep ravines, waterfalls, rare birds and rare plants produce an important environmentally sensitive area.

The shoreline of Lake Iroquois occurs just south of CN railway tracks. Halton till occurs above and below the escarpment. An area of lacustrine and outwash sand occurs in the southwest corner of the area, below the escarpment. Well-drained and shallow Farmington loam forms a belt above the escarpment. Ravines are cut deeply into the rock at the base of the escarpment. Grimsby sandy loam and Ancaster silt loam soils have developed on the sands in the southwest corner of the area. Both soils are well-drained and presently under agriculture.

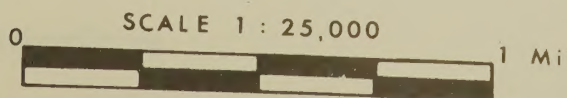
It is especially remarkable that this area and the equally important Royal Botanical Gardens have survived the strong destructive pressures of the nearby urban metropolis of Hamilton, Dundas and Ancaster.



15

Topographic Map Reference - DUNDAS 30M/5d Edition 3

Military Grid Reference - 866930



ecologistics limited

1976

CRITERIA FULFILLED - 1, 5, 6, 8 and 9

Criterion One

The Niagara Escarpment is a unique geological landform extending 380 miles through southern Ontario. In the Hamilton area it is present as a prominent topographic bedrock feature with a vertical drop of over 200 feet. The most common expression of the escarpment is the mantled scarp, formed as a consequence of the hard caprocks eroding less quickly than the softer underlying rocks.

Criteria Five and Six

Most of the area is heavily forested with the few openings being abandoned farmland that is developing into open shrub communities. The deep ravines and escarpment faces are subjected to various amounts of sunlight, water and wind depending upon their orientation and location. As a result a high diversity of plant communities and species have developed due to these environmental effects (Manning, 1975). Several of the plant species found here are Carolinian and therefore are reaching their northern limit for Canada. Some of the rarer and more unique plants that show the diversity of plant life are: Big Bluestem (Andropogon gerardii) - a western prairie plant, Bellwort (Uvularia grandiflora), Wood Lily (Lilium philadelphicum), Wild Yam (Dioscorea villosa), Purple Rock Clematis (Clematis occidentalis), Moonseed (Menispermum canadense), Green Violet (Hybanthus concolor) a very rare plant, Woodland Sunflower (Helianthus divaricatus) (Pringle, 1969) and Wild Aster (Aster prenanthoides) (Pringle, pers. comm.). Some of the Carolinian plants that are near the north edge of their natural range in Canada are: Chestnut Oak (Quercus muhlenbergii), Red Mulberry (Morus rubra), Sassafras (Sassafras albidum), Bladdernut (Staphylea trifolia), New Jersey Tea (Ceanothus americanus) (Pringle, 1969), and Yellow Mandarin (Disporum lanuginosum) (Bryant, Wood Duck 24(4):46). Two of the rare ferns that occur there are Purple Cliff Brake (Pallaea atropurpurea) (Manning, 1975) and Walking Fern (Camptosorus rhizophyllus) (Bryant, Wood Duck 24(4):46).

Red-shouldered Hawk (Buteo lineatus)

(Rock Chapel - Wormington, pers. comm.). The bulky nest is placed high in a tree, usually in mature woodlots (Godfrey, 1966). This species is declining in numbers in southern Ontario, possibly due to conflict with Red-tailed Hawk (Campbell, in press). This is the only known Regional summering location and all disturbances, especially during the nesting period from April through July, should be avoided. It is felt that nests may occur in the more natural parts of Flamborough Township (Curry, pers. comm.).

Louisiana Waterthrush (Seiurus motacilla)

(Rock Chapel - Corer's Falls - 3 young out of nest - Wood Duck 13(1): 19, Dowall - Wood Duck 8(9):6). The bird requires undisturbed natural forests that contain a fast flowing river or stream in a deep ravine or a mountainous condition, for its breeding habitat (Godfrey, 1966, C. Woods, pers. comm.). Therefore it is found in our area where streams pour over the Niagara Escarpment into wooded gorges. We know of 10 breeding stations for this species in Canada of which five are in this Region (Wormington, pers. comm.). These stations are: 3 escarpment areas in Halton County (Wormington, pers. comm.), 1 escarpment falls in the Niagara Region (Meyers, pers. comm.) and 1 area near London, Ontario (Godfrey, 1966). Therefore half the known Canadian breeding areas are in the Hamilton-Wentworth Region.

Northern Ribbon Snake (Thamnophis sauritus septentrionalis)

Many along shores (Manning 1975). Perhaps more common in the heavily-glaciated kettle bog-kame terrain of southwestern Ontario, but relatively restricted in Wentworth.

Cerulean Warbler (Dendroica cerulea)

Rock Chapel - Wormington, pers. comm., North, pers. comm.). In the nesting season this species can be found in mature deciduous woodland, foraging and singing high in the trees. Nests are placed in a branch of a tree from 25 to 60 feet up (Godfrey, 1966). Each of the three Regional stations probably only contain one pair of this species (Curry, pers. comm.). This bird nests in Canada only in southern Ontario (Godfrey, 1966).

Criterion Eight

This area has an important educational function with respect to geology in that it provides an outcrop of the Silurian rocks within a unique mantled escarpment. The height of the escarpment at this point exceeds 250 feet.

The escarpment formed as the soft underlying rocks eroded away leaving the hard dolomite caprock exposed. From top to bottom the commonly occurring rock units are: Guelph buff dolomite; Guelph black shale and dolomite; Goat Island and Gasport grey dolomite; Cabot Head grey and red shale; Whirlpool sandstone and Queenston red shale.

Criterion Nine

This area of the Niagara Escarpment is heavily used by people seeking passive forms of enjoyment of the natural environment. It is especially popular with hikers on the Bruce Trail. From the escarpment lip one can get an impressive view of the Dundas Valley, the Royal Botanical Gardens and out to Lake Ontario.

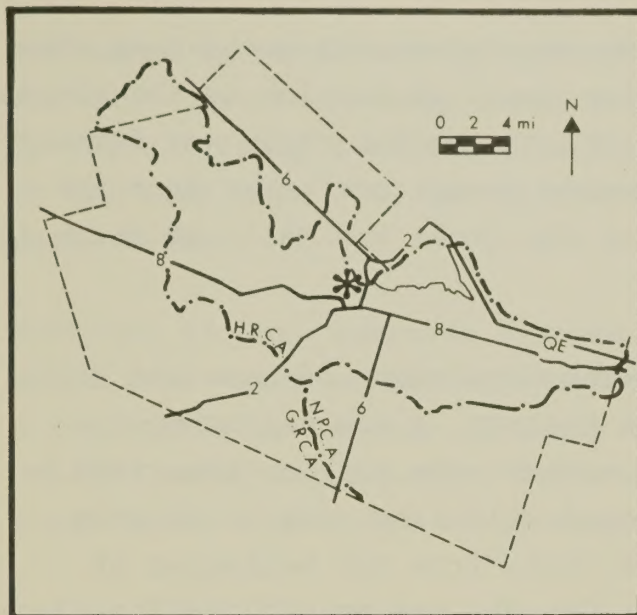
Looking from these areas this part of the escarpment is seen as very beautiful forested ravines and cliffs. An important view that provides a natural edge to the horizon for many of the urban dwellers of Hamilton and Dundas.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION	●	
ACTIVE RECREATION	●	
EXTENSIVE FORESTRY	●	
INTENSIVE FORESTRY	●	
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT	●	
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

Most of the area is clothed in vegetation. Any disturbance of this vegetative cover would result in serious erosion problems. The steepness and depth of the ravines give evidence of the erosive power of the streams. The weathered Queenston shale is quite susceptible to erosion. Sedimentation of the wetlands of Cootes Paradise would be a result of increased erosion.

Development along the streams above the escarpment will change runoff regimes. This could also increase downstream erosion rates.



NAME

Royal Botanical Gardens -
Cootes Paradise
CONSERVATION AUTHORITY

Hamilton Region
Halton Region

CATEGORY

A

OWNERSHIP

Public (Royal Botanical Gardens,
McMaster University) and Private

SIZE

1,840 acres

LOCATION

At the western end of Lake Ontario. Surrounded on three sides by urbanization, Town of Dundas (west), City of Hamilton (south) and the City of Burlington (east).

GENERAL DESCRIPTION

This area has long been recognized as an important area for wildlife. Thomas McIlwraith of Hamilton, a founding member of the American Ornithological Union, wrote The Birds of Ontario in 1886. Many references to the birds of the Dundas Marsh can be found in its pages. A few include: "In former years I used to find the Barred Owl regularly every fall in the ravines along the south shore of the Dundas Marsh, but now many of the pines and hemlocks which formed an inviting retreat are cut down, and the bird has sought for greater seclusion elsewhere" (Pl154).

"Near Hamilton it is quite common, a few pairs generally spending the summer in the Waterdown Creek, and also in the Dundas Marsh" (Florida Gallinule).

"Twenty-five years ago I have seen them leading out their young from one of the inlets of the Dundas marsh;, but of late years they have been observed only as passing migrants in spring and fall" (Wood Duck). In the last few years the nest boxes placed by the Hamilton Naturalists' Club have encouraged the Wood Duck to return and prosper in this marsh. (Wood Duck 19(8):118).

The value of the area was recognized by the Provincial Government when it announced an Order-in-Council to give legal protection to the sanctuary in February 1927. The importance of the Dundas Marsh was further recognized by the public and the following quotes are taken from the Toronto Mail and Empire, predecessor of the Globe and Mail, of March 16, 1927:

"Through the splendid work of the Ontario Department of Game and Fisheries and the Hamilton Bird Protection Society, a new Sanctuary has come into being. This sanctuary will undoubtedly play an important part in the preservation of our feathered wild life, for it is none other than the well-known Dundas Marsh that, from the beginning of time, as the white man reckons time in Canada, has been a nesting place for millions of our birds, and, what is equally important in the bird world, a resting place for innumerable weary migrants that still have thousands of miles to travel.

All lovers of the wild things of the out-of-doors will rejoice that this society and the provincial department are uniting to hold this spot ever sacred to the feathered life that first made it a place of song and beauty. It may be that at last we are nearing the trail of the red man when he called the wild things "little brothers".

The Royal Botanical Gardens now owns and manages the majority of the area and one of the published objectives for Cootes Paradise is; "to maintain this water and marsh habitat with contiguous lands as a wildlife sanctuary, by protecting the integrity of habitats for a rich variety of flora and fauna" (RBG Policy Statement, 1975).

The central portion of the area is open water and marsh which is surrounded by higher ground which is mainly composed of lacustrine and outwash sands and small alluvial fans. A small area of Halton till occurs in the north, above the Lake Iroquois shoreline. The slopes are steep, in the 6-15% range and are very steep in the ravines that dissect the north side of the marsh.

The marsh is continuously flooded. Developed upon the lacustrine sands are well-drained Grimsby sandy loam soils. A small area of well-drained Springvale sandy loam soil has developed on the alluvial fan deposits on the west side. On the Halton till to the north, well-drained Oneida soils occur.

Moderate slopes, numerous streams, deeply cut channels, relatively low yield from water wells, and rather impermeable red shale suggest that a reasonable percentage of water flowing from the escarpment to Lake Ontario occurs as runoff. Deficiency of well records in the area of study makes evaluation of groundwater regimes difficult.

Porous surficial stream deposits and lacustrine deposits as mapped by Karrow (1963) are favourable for providing infiltration. It seems likely that water penetrating these materials would discharge from the nearby shoreline bluffs into the bay.

The Queenston shale comprises the bedrock, yielding rather low quantities of poor quality water. A particular well in the northeast corner of the sensitive area has a water elevation 35 feet below Lake Ontario level and it has a static level 17' below lake level. Therefore, it appears probable that water discharge from the bedrock aquifer into Lake Ontario does not occur in or near here.

The area is well protected by the Royal Botanical Gardens but some degradation has occurred due to highway development on the south side (North, pers. comm.), pollution entering the marsh from Spencer Creek (Ham. Fed. of Environmental Groups, 1972) and too much passive recreation. It is suggested that Yellow Ladies' Slipper Orchid (Cypripedium calceolus) and Fringed Gentian (Gentiana crinita) are now extinct in the area due to picking by admirers (Pringle, pers. comm.).

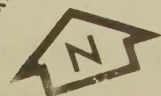
The people of the Region are very fortunate in having such a remarkable natural area on their doorstep.



16

Topographic Map Reference - DUNDAS 30M/5d Edition 3

Military Grid Reference - 880920



SCALE 1 : 25,000

1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 3, 4, 5, 6, 7, 8 and 9

Criterion Three

Cootes Paradise is an unusual and high quality biological community. It has been studied extensively through the years and a large number of papers have been published on the marsh (Bastin, 1963; Meiler, 1963; Roseborough, 1963; Lamoureux, 1961; Scott, 1970; Judd, 1949; Judd, 1950; Kay, 1949). Many species of birds, fish, reptiles, amphibians and insects live in the marsh. Many of these species are uncommon or rare and are listed elsewhere in this report.

Recent organic and industrial pollution from Spencer Creek has started to degrade the water quality. The Desjardens Canal has very poor water quality with frequent summer temperatures above 24°C and low dissolved oxygen levels most of the time (MOE; Ham. Fed. of Environmental Groups, 1972 pp.38-41). Some sections of the marsh has better water quality because of a number of streams entering from the north that have good water quality (Lamoureux, pers. comm.).

Turner (1948) surveyed the fish populations of Cootes Paradise; Warren (1950) surveyed those of Cootes Paradise and Burlington Bay. They found a number of species; but whether all have survived is unknown.

A number of common species found in the marsh are: Alewife, Central Mudminnow, Northern Redbelly Dace, Carp, Golden Shiner, Spottail Shiner, Spotfin Shiner, Bluntnose Minnow, Longnose Dace, White Sucker, Tadpole Madtom, Banded Killifish, Threespine Stickleback, Pumpkinseed, Bluegill, Black Crappie, Johnny Darter, and Logperch. Several species are not found elsewhere in the Hamilton-Wentworth Region because they live in lakes or large rivers. They are: Alewife, Golden Shiner, Spottail Shiner, Spotfin Shiner, Tadpole Madtom, Threespine Stickleback, Black Crappie and Logperch.

Carp are the only fish that are presently caught commercially in Cootes Paradise (R. Jean-Marie, pers. comm.).

Bowfin (Amia calva)

(Turner (1948), Warren (1950)). The Bowfin is a spring spawner. It inhabits warm, swampy, weedy areas of lakes and rivers, and can withstand high temperatures and low dissolved oxygen levels. It can gulp air. It eats virtually all other fish species, and has been considered destructive of valuable species (Scott and Crossman, 1973).

Gizzard Shad (Dorosoma cepedianum)

(Turner (1948)). The Gizzard Shad usually inhabits shallow areas of lakes, bays, river mouths, or large rivers. They spawn in spring or early summer. Young Gizzard Shad are an important forage fish for a number of larger species. This shad is considered rare in Lake Ontario (Scott and Crossman, 1973).

Rainbow Trout (Salmo gairdneri)

(MNR Sensitive Areas). There are "limited angling opportunities" for Rainbows in Cootes Paradise (MNR Cambridge District Sensitive Areas Mapping). Originally a native of western Canada, it is now one of the most important sport fish in the east as well. Spawning usually occurs in spring. The fish migrate up stream to spawn. During the rest of the year, they may remain in streams or live in lakes or the sea. In streams, Rainbows are usually found in small to medium size streams, with shallow water and gravel bottoms. They need cool temperatures, but are not as sensitive as Brook Trout (Scott and Crossman, 1973).

Northern Pike (Esox lucius)

(MNR Sensitive Areas). There are "limited angling opportunities" for Northern Pike in Cootes Paradise (MNR Cambridge District Sensitive Areas Mapping). Northern pike are found in a variety of habitats, but most often clear, warm, heavily vegetated waters of slow rivers or bays. They spawn in April or early May. Pike are important as a sport and a commercial species, but may also be a problem because they eat other, more valuable, species (Scott and Crossman, 1973).

Brown Bullhead (Ictalurus nebulosus)

(Turner (1948), Warren (1950)). The Brown Bullhead is found in a variety of lakes or streams with slow, warm, weedy areas. It is tolerant of high temperatures, low oxygen levels, and seems particularly resistant to domestic and industrial pollution (Scott and Crossman, 1973).

Brook Silverside (Labidesthes sicculus)

(Turner (1948)). The small (3") and slender Brook Silverside usually lives in clear, weeded lakes, in the surface waters. It spawns in spring or early summer. This species is sensitive to turbidity (Scott and Crossman, 1973).

Largemouth Bass (Micropterus salmoides)

(Turner (1948)). Largemouth bass are usually found in warm, shallow lakes or bays, almost always in areas with dense aquatic vegetation. They can withstand some turbidity, and high temperatures, but are not tolerant of low oxygen conditions. Spawning takes place between late spring and mid-summer. The largemouth bass is an important sport fish in eastern Canada (Scott and Crossman, 1973).

Yellow Perch (Perca flavescens)

(Turner (1948), Warren (1950)). The Yellow Perch is very adaptable to different habitats: it is found in lakes, ponds and rivers, but does prefer vegetation and shallow water. It is fairly tolerant of low oxygen levels but not of turbidity. It spawns in the spring, and is an important sport fish (Scott and Crossman, 1973).

Slimy Sculpin (Cottus cognatus)

(Turner (1948)). This Sculpin is a cold-water species. It is found in deeper waters of both lakes, where it is often associated, as it is here, with the Threespine Stickleback and streams where it is often associated with the Brook Trout. It is a spring spawner. Many larger fish eat the Slimy Sculpin (Scott and Crossmen, 1973).

Criterion Four

Cootes' Paradise is the largest marsh in the Hamilton-Wentworth Region. Along with the small marsh at the mouth of the Red Hill Creek, it is the last shoreline marsh left in this Region, along Lake Ontario and its bays. It is remnant of a large marsh that once extended from Cootes Paradise along the south shore of Hamilton Harbour to Cootes Paradise (North, pers. comm.). Even as late as 1886 Thomas McIlwraith wrote "the little Bittern is common enough in suitable places all around the bay". This implies that this species which prefers cat-tail marshes (Godfrey, 1966) was able to find suitable habitat "all around the bay". Of course today industrial and urban development has destroyed most of this type of habitat in the bay area, leaving Cootes Paradise as an important and unusual habitat that now has limited representation in the Region. In fact Cootes Paradise is the last, big marsh left on the Lake Ontario shoreline from Toronto to Niagara Falls.

Criterion Five

The Royal Botanical Gardens Sensitive Area has a high diversity of biological communities and the associated plants and animals. Some of the communities include: upland deciduous forest, old field-shrub complexes, pine forest (reforestation), floodplain deciduous forest, floodplain field, marsh, slough, shallow open water, river, creeks and a multitude of gradations where different community types met. Aleksander Tamsalu divided the Cootes Paradise and Hendrie Valley Sanctuaries into 270 ecologically and physiographically defined areas (Pringle, 1969). The Royal Botanical Gardens' Checklist of the Spontaneous Vascular Flora includes 936 species of vascular plants (Pringle, 1969). Each of these species has its own role to play in the total environment. The numbers of communities and species present give an idea of the high diversity found in this sensitive area.

Criteria Six and Seven

This sensitive area is large (around 1,800 acres) and many sections of it are undisturbed. Some areas disturbed in that part are regenerating under the Royal Botanical Gardens protection and as a result some quite large trees, of a variety of species, now occur. Some of the oldest trees include a 360 year old White Oak and a 250 year old White Cedar (Lamoureux, 1971). The RBG is an important sanctuary for many species, but is particularly valuable in protecting the creatures that inhabit marshes.

In 1973, Tall Thoroughwort (Eupatorium altissimum) was discovered here and this was the first and only location known for this species in Canada (Pringle, Wood Duck 27(5):83). Other rare and uncommon plants are: Clinton's Fern (Dryopteris clintoniana), Yellow Mandarin (Disporum lanuginosum), Flowering Dogwood (Cornus florida), Bottle Gentian (Gentiana andrewsii), Sassafras (Sassafras albidum), Spicebush (Lindera benzoin), Sweet Chestnut (Castanea dentata), Chestnut Oak (Quercus muhlenbergii), Grass-of-Parnassus (Parnassia glauca), (Pringle, 1969), and Tulip Tree (Liriodendron tulipifera) (Watters - Wood Duck 5(2):6).

A large number of mammals, herptiles and birds breed here, many of which are rare in the Region.

Muskrat (Ondatra zibethicus zibethicus)

Chief concentration in the county (Warren, Prince and Henderson MS).

Mink (Mustela vison vison)

(Warren, Prince and Henderson MS, and ROM #18809). One of the few remaining recorded localities in Wentworth.

Mudpuppy (Necturus maculosus maculosus)

(Brown, 1928, Warren, 1950). Whether this totally-aquatic, large salamander has survived pollution of the Marsh is not known...."tolerates turbidity, but in warm or polluted water, oxygen supply to gills limited"; "because of diet, pollution, and dams, could be declining in southern Ontario. Tentatively included among species to be investigated

by Campbell for Canadian Wildlife Service during 1976" (Campbell MS 1975). In Wentworth also reported from Hamilton Harbour, at least formerly.

Common Snapping Turtle (Chelydra serpentina serpentina)

Marsh is probably main stronghold for this species in county; nests in muskrat houses and banks of Marsh (Judd 1951 and Martin 1950). Common in southern and central Ontario, but much persecuted and commercially-exploited.

Wood Turtle (Clemmys insculpta)

Along canal (G. North to Campbell, pers. comm. 1971). Very scarce now in southwestern Ontario, and perhaps endangered throughout Ontario (Campbell MS 1975).

Blanding's Turtle (Emydoidea blandingi)

(Martin 1950). Irregularly distributed throughout southern Ontario, especially in extensive marsh/swamp areas; more common to south and west. One of 3 Wentworth recorded locales.

Map Turtle (Graptemys geographica)

(Martin 1950 and pers. comm, from RBG to Campbell, 1968). Formerly not uncommon, but may have been reduced or eliminated by pollution, as very aquatic and feeds extensively on mollusks and crayfish. Some evidence of decline throughout its range in southern Ontario; distribution apparently always interrupted. One of 2 Wentworth sites.

Eastern Spiny Softshell (Trionyx spiniferus spiniferus)

May be extinct now in the Marsh (Campbell MS 1975); declining severely throughout southern Ontario (where confined largely to Lake Erie and its drainage) probably from pollution (study in progress by Campbell for Canadian Wildlife Service).

Northern Water Snake (Natrix sipedon sipedon)

Marsh is a refuge for this wide-ranging, fairly common but much persecuted and often locally-eliminated snake (Martin 1950).

Massasauga Rattlesnake (Sistrurus catenatus catenatus)

In early settlement days, plentiful along Marsh, but last known specimen killed in 1949 (Martin 1950).

Least Bittern (Ixobrychus exilis)

(Cootes Paradise - McLaren pers. comm, nest with 5 eggs - Wood Duck 23(3):34). Nests in freshwater marshes (Godfrey, 1966). Once common in the Region (McIlwraith, 1886) but now rare due to habitat destruction associated with landfill projects and wetland drainage (North pers. comm.).

Northern Shoveler (Spatula clypeata)

(Cootes Paradise - 13 young out of nest - Wood Duck 24(3):30). Nest made of grasses and similar material, lined with down, on the ground and usually not any great distance from water (Godfrey, 1966). This nesting record is unusual (North pers. comm.) for a species that normally breeds in Canada from Manitoba west (Godfrey, 1966).

Green-winged Teal (Anas carolinensis)

(Dundas Marsh - 17 adults, 9 young out of nest - Wood Duck 19(2):21). Nests on the ground usually near fresh water but sometimes some distance from it. Nests generally concealed by grass or shrubbery (Godfrey, 1966). This is only one of two nesting stations in the Region. This station is south of the normal Canadian nesting range (Godfrey, 1966) and the birds first nested here around 10 years ago (Curry, pers. comm.).

Virginia Rail (Rallus limicola)

(Cootes Paradise - 6 adults, 1 young - Wood Duck 25(3):34). This species nests in freshwater marshes (Godfrey, 1966). With the loss of shoreline marsh in the last 200 years, in this Region, this bird has declined, like many other marsh species. It nested in surprisingly small scraps of marsh left in the industrial area of Hamilton in the 1960's (ONRS). Only four known Regional nesting areas.

Common Gallinule (Gallinula chloropus)

(Cootes Paradise - 8 young out of nest - Wood Duck 26(3):40, Cootes Paradise - 1968 - ONRS, Dundas Marsh - 1970 - ONRS). This somewhat colonial nester can be found in freshwater marshes of various sizes, usually where there is at least a small area of open water (Godfrey, 1966). In 1886 McIlwraith notes that "Near Hamilton it is quite common, a few pairs generally spend the summer in the Waterdown Creek, and also in the Dundas Marsh". North (pers. comm.) has counted up to several hundred of these birds, in breeding season, in the marshes of East Hamilton in the 1930's. Most of these marshes have since been destroyed by industrial, urban and transportation development. Van Wagner's Beach is a valuable piece of these once extensive marsh. Only two remaining breeding stations are known.

American Coot (Fulica americana)

(Cootes Paradise - 1 young out of nest - Wood Duck 24(3):31, 6 young out of nest - Wood Duck 26(3):40, Cootes Paradise - 1968 - ONRS, Dundas Marsh - 1970 - ONRS). This more or less colonial nester is found in freshwater marshes, ponds, sloughs, lakes and slow rivers (Godfrey, 1966) that have well developed marsh-type vegetation on the edges. Only one of two Regional breeding stations.

Black Tern (Chlidonias niger)

(Cootes Paradise - nests found 1941, 65, 67, 68, 69 - ONRS, Wormington pers. comm., Judd - Wood Duck 5(4):5). The nest is placed on rafts or mats of marsh vegetation floating in shallow water of lakes or marshes, sometimes on muskrat houses or on solid ground. The nesting habitat is mainly watery marshes, lakes, ponds, sloughs and rivers in either treeless or wooded country (Godfrey, 1966). This is another marsh nesting species that has been declining in the Region due to habitat destruction. Only two Regional nesting stations known.

Long-eared Owl (Asio otus)

(Westdale Park - nested there often, may be extirpated there now - North, pers. comm.). The nests are in woodland, usually 10 to 30 feet up in a tree in an old hawk or crow nest. The habitat is usually

the denser parts of woods (not necessarily extensive) the preferred being coniferous or mixed woods (Godfrey, 1966). This is one of six Regional nesting stations but the birds are probably no longer present in Westdale Park.

Yellow-throated Vireo (Vireo flavifrons)

(Westdale Ravine - Wood Duck 24(4):50). The nest is suspended from a fork in a tree branch. Prefers open stands of mature deciduous trees, often in residential areas, foraging in upper stratum (Godfrey, 1966). This uncommon species is found in only two stations in the Region.

Brown Creeper (Certhia familiaris)

(RBG - 1 adult, 3 young out of nest - Wood Duck 26(3):44, Coldspring Valley - Wood Duck 28(1):17). The preferred habitat is primarily mature coniferous or deciduous woodland with nests placed under a piece of loose tree bark or in a natural cavity such as an old woodpecker hole (Godfrey, 1966). Two areas contain this bird as a nester.

Long-billed Marsh Wren (Telmatodytes palustris)

(Dundas Marsh - singing on territory, June 20, 1974 - Curry pers. comm.). Cat-tail and bulrush marshes are the preferred nesting habitat. The nest is a largish ball of marsh vegetation with side entrance and is attached to upright marsh plants (Godfrey, 1966). One of four Regional stations.

Blue-gray Gnatcatcher (Polioptila caerulea)

(RBG - Spencer Creek - ONRS, 1974, Westdale Park - Wood Duck 24(4):50, Idema - Wood Duck 14(5):91). The small nest is saddled on a limb or placed in the fork of a branch anywhere from 10 to 60 feet above the ground, but usually quite high. It is found most often well up in mature trees, but may be found also in low thickets and small growth (Godfrey, 1966). An uncommon southern bird that is found in only 3 stations.

Prothonotary Warbler (Protonotaria citrea)

(Dundas Marsh - James Dowall, Wood Duck 8(9):6-8). This rare southern

warbler breeds in the vicinity of flooded or swampy woodlands, in a cavity in a tree or nest box (Godfrey, 1966). In the mid-1950's this species nested here successfully. Only four breeding stations for Canada are known: Rondeau, Minesing Swamp, Point Pelee and Dundas Marsh. Only the first three have had nests recently.

Cerulean Warbler (Dendroica cerulea)

(Westdale Park - 2 birds and nest - Wood Duck 23(3):41). In the nesting season this species can be found in mature deciduous woodland, foraging and singing high in the trees. Nests are placed in a branch of a tree from 25 to 60 feet up (Godfrey, 1966). Each of the three Regional stations probably only contain one pair of birds (Curry, pers. comm.) of this species. This bird nests in Canada only in southern Ontario (Godfrey, 1966).

Chestnut-sided Warbler (Dendroica pensylvanica)

(Dundas Marsh - 2 adults with 2 young out of nest - Wood Duck 27(1):18, Cootes Paradise - ONRS (1966)). Preferred habitat is open bushy second growth and thickets deciduous, on both dry and moist ground. Nests are placed in sapling, low bush or vine, usually 1 to 3 feet up (Godfrey, 1966). One of only three breeding areas.

Mourning Warbler (Oporornis philadelphia)

(Westdale Park - North, pers. comm.). The ground nest is placed in tangles of briery shrubs or other low vegetation. Habitat is shrubbery and bushes of young second growth on burntlands and clearings; woodland edges and sunny openings; margins of bogs and marshes (Godfrey, 1966). This uncommon warbler of lowland, open forests is found in only 5 areas in the Region.

Criterion Eight

The location of McMaster University, immediately adjacent to this area, has resulted in a large amount of basic biological research being conducted in this area. The resulting papers published by the Royal Botanical Gardens and those emanating from McMaster are too numerous

to mention in total but a few include: (Pringle, 1969; Judd, 1949, 1950, 1951; Lamoureux, 1961 and 1971; Bastin, 1963; Meiler, 1963; Roseborough, 1963; Scott, 1970; Kay, 1949; Warren, 1950; Turner, 1948). The location of the area, its administrative and management framework and its significant natural features make it particularly suitable for conservation education and scientific research purposes.

Criterion Nine

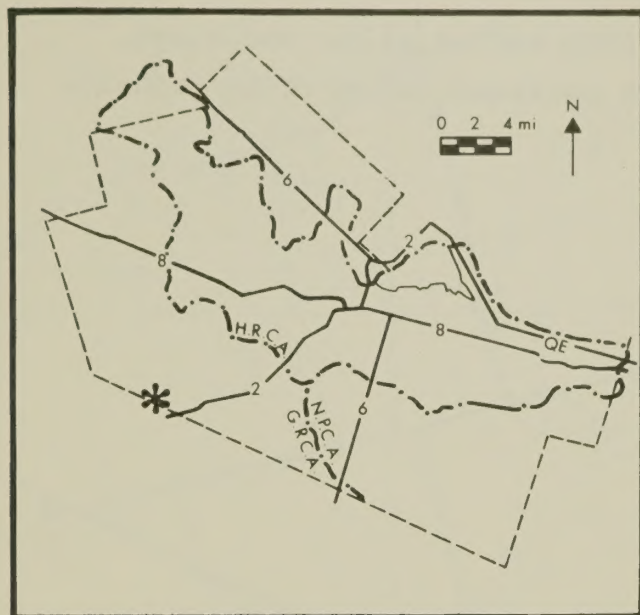
The forests, hills, marshes and waters of the Royal Botanical Gardens have high esthetic value in themselves and provide a particularly interesting backdrop to the urban areas of Hamilton and Dundas. The distant view of the Gardens from the Niagara Escarpment, near Borer's Falls is particularly pleasing. Visitors to Hamilton, from the north and northwest, enter through or beside this large natural area and it provides a valuable first introduction to the city.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION	●	
EXTENSIVE FORESTRY	●	
INTENSIVE FORESTRY	●	
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT	●	
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

The Royal Botanical Gardens - Cootes Paradise Area is particularly vulnerable to surrounding urban pressures because 1) the marsh itself is easily disturbed and 2) the urban development is now immediately adjacent to the sensitive area. Careful and considerate land-use planning, with the appropriate environmental input, is essential in adjacent areas.

Water based pollutants are now affecting the marsh (Ham. Fed. of Environmental Groups, 1972) and it is essential that no further degradation be allowed. Sedimentation is already a problem and is largely derived from the weathered Queenston Shale. Development or alteration, upstream, could lead to an increase in sedimentation.



NAME

Langford Forest

CONSERVATION AUTHORITY

Grand River

CATEGORY

C

OWNERSHIP

Private

SIZE

100 acres

LOCATION

North of Langford on the edge of the Hamilton-Wentworth Region in the Town of Ancaster.

GENERAL DESCRIPTION

This is a large, natural, mature forest with many full-sized American Beech and White Pine trees. The underbrush is quite dense which indicates good natural regeneration.

The surficial deposits of the area consist of glaciolacustrine, deep-water sediments of the bottom of Lake Warren. The well-drained Brantford silt loam and Grimsby sandy loam as well as the imperfectly drained Beverly silt loam and Vineland sandy loam have developed on these deposits. The area is characterized by an irregular set of ridges and hummocks. The overall slope is in the 0 to 2% range but some ridge slopes approach 9%.

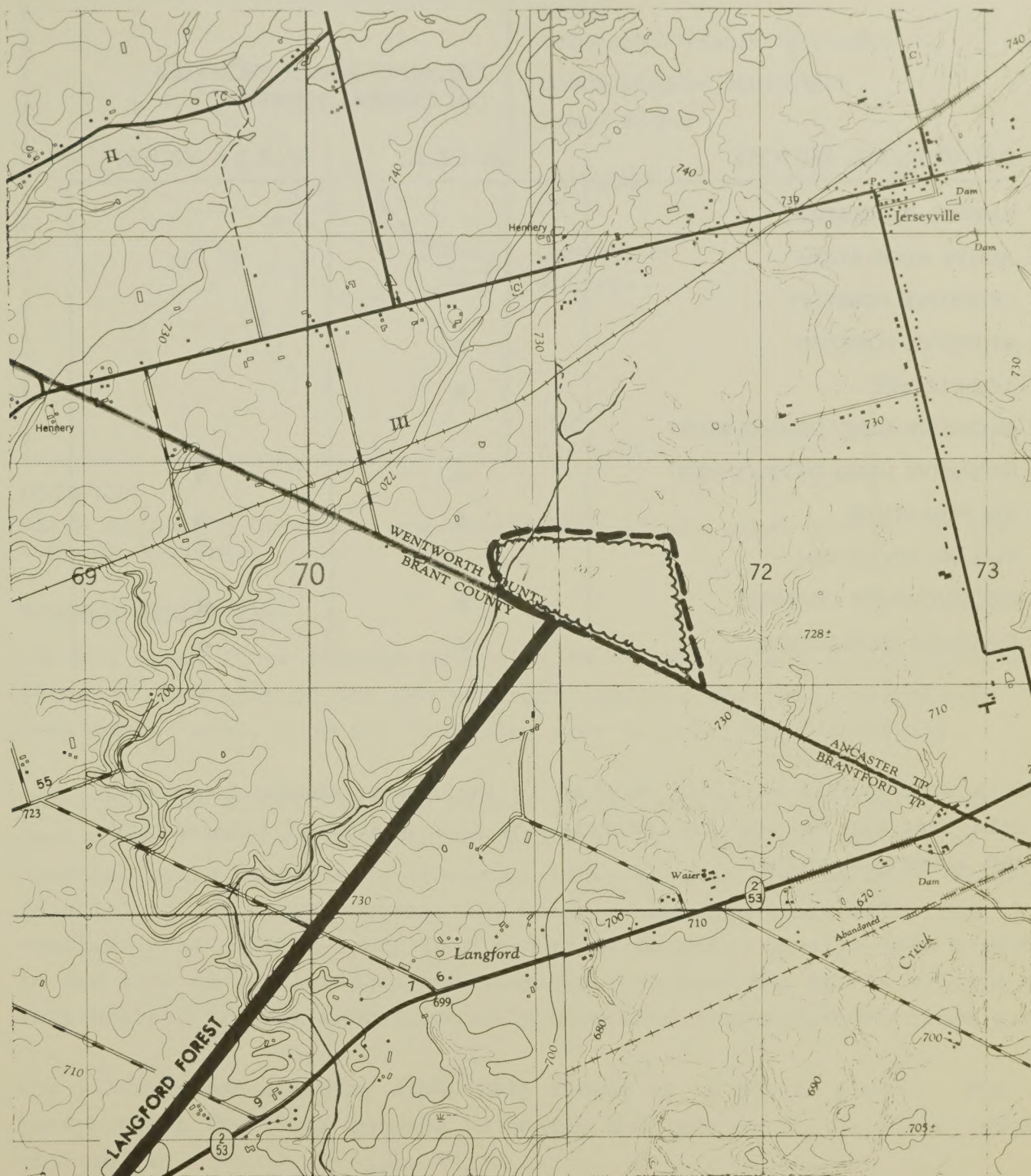
Most wells in the nearby area penetrate 130 feet of silty clay before bottoming in the Guelph dolomite. Fresh water is most frequently found in small quantities at about 20 feet into bedrock. The hydraulic gradient dips to the southwest, suggesting an overall movement of groundwater in that direction.

A few wells draw low yields of water from varved silts and clays. Whether these water bearing strata are confined or serve to recharge lower systems is unknown.

HAMILTON — WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

AREA
NO .

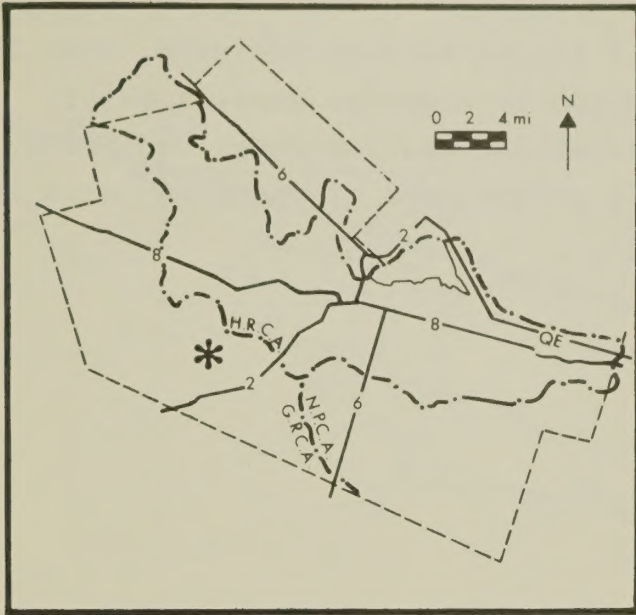
17



NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY	•	
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION		
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•

This area should be field checked in the summer months to provide data that can be used to indicate its true status of sensitivity and important values.



NAME

Southwest Summit Wetland

CONSERVATION AUTHORITY

Grand River

CATEGORY

C

OWNERSHIP

Private

SIZE

225 acres

LOCATION

North of Duff's Corner on the west border of the urban section of the Town of Ancaster.

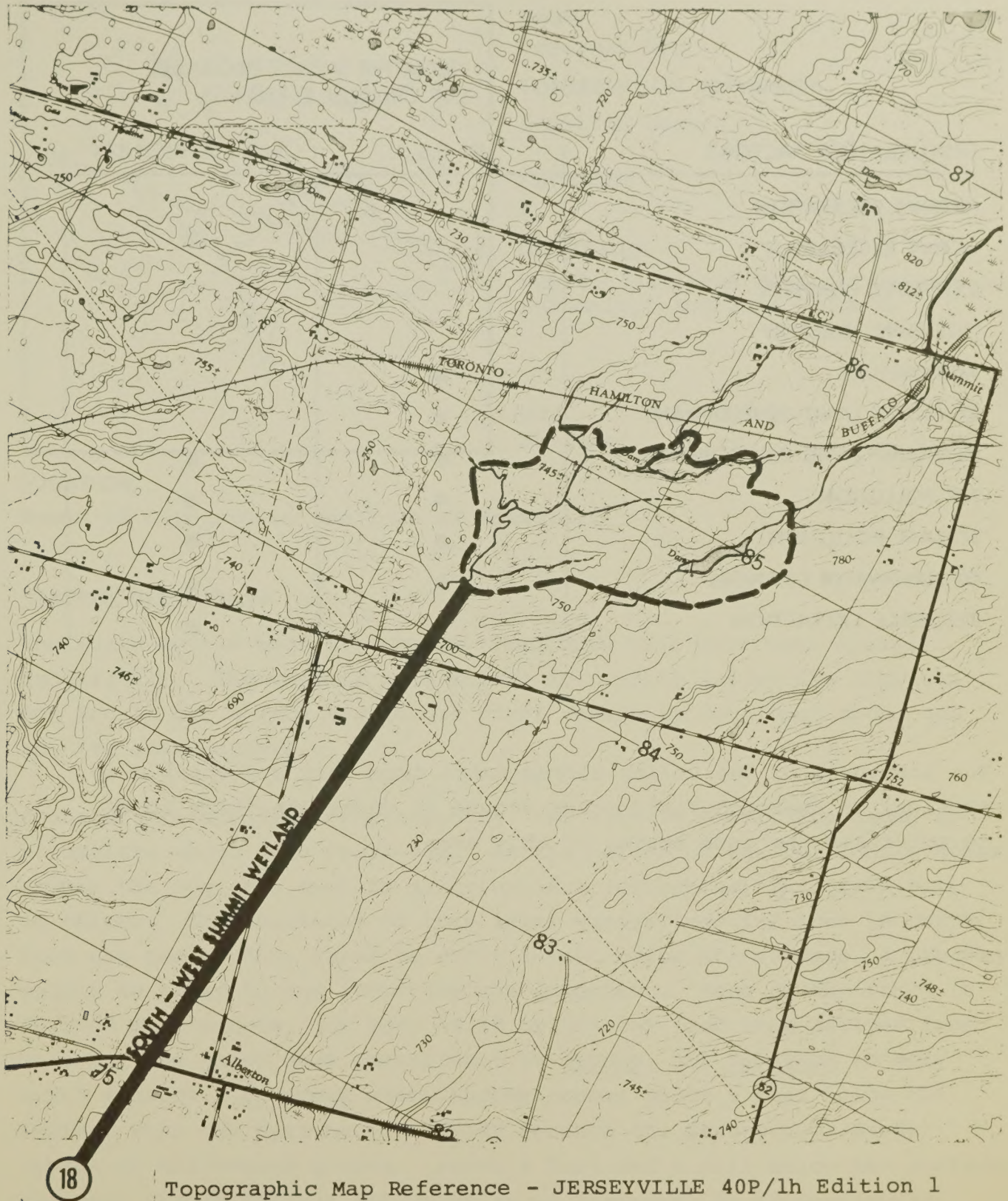
GENERAL DESCRIPTION

The Big Creek flows through this mixture of lowland and upland deciduous forests. The size of the two adjacent woodlots and their relatively undisturbed state suggests that this area be considered carefully.

The surficial deposit is Lake Warren glaciolacustrine deep-water sediment. The stream valleys contain alluvial silt loam and silty clay loam sediments of variable drainage, known as the Alberton soil series. Parallel to the stream courses are soils of the Brantford silt loam complex. The Grimsby sandy loam occurs as deposits on silt loam materials in the form of small ridges and hummocks. Between the stream valleys are well-drained Grimsby sand loam soils developed from water-deposited sands.

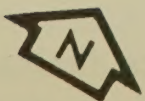
The valley sides are very steep with slopes up to 30% in places. The land between the river courses is gently undulating, in the slope range of 5 to 9%.

The local groundwater flow is parallel to the surface drainage, that is, to the southwest. Nearby wells yield low to moderate quantities of fresh water from Lake Warren glaciolacustrine shallow water sediments. Discharge from the sediments, into the stream beds of the study area is a possibility.



Topographic Map Reference - JERSEYVILLE 40P/1h Edition 1

Military Grid Reference - 760850



0 SCALE 1 : 25,000 1 Mi

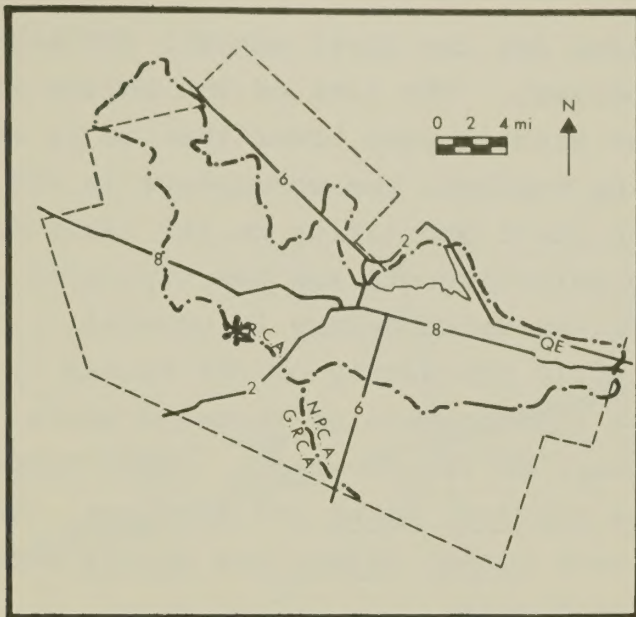
ecologistics limited

1976

**NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS**

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT	●	
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

The steepness of the valley slopes makes them very susceptible to erosion. A thorough field study should be undertaken here so as to ascertain the true status of this area.



NAME

Copetown Bog

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

A

OWNERSHIP

Public (Hamilton Region Conservation Authority) and some Private

SIZE

95 acres

LOCATION

South of Copetown in the Town of Ancaster.

GENERAL DESCRIPTION

The three kettle bogs are unusual landforms that have been studied extensively. The western most kettle is usually called the Copetown Bog and it has a rare and unique plant community developed upon, and in, its acid wetness.

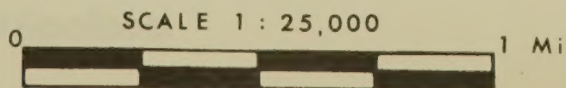
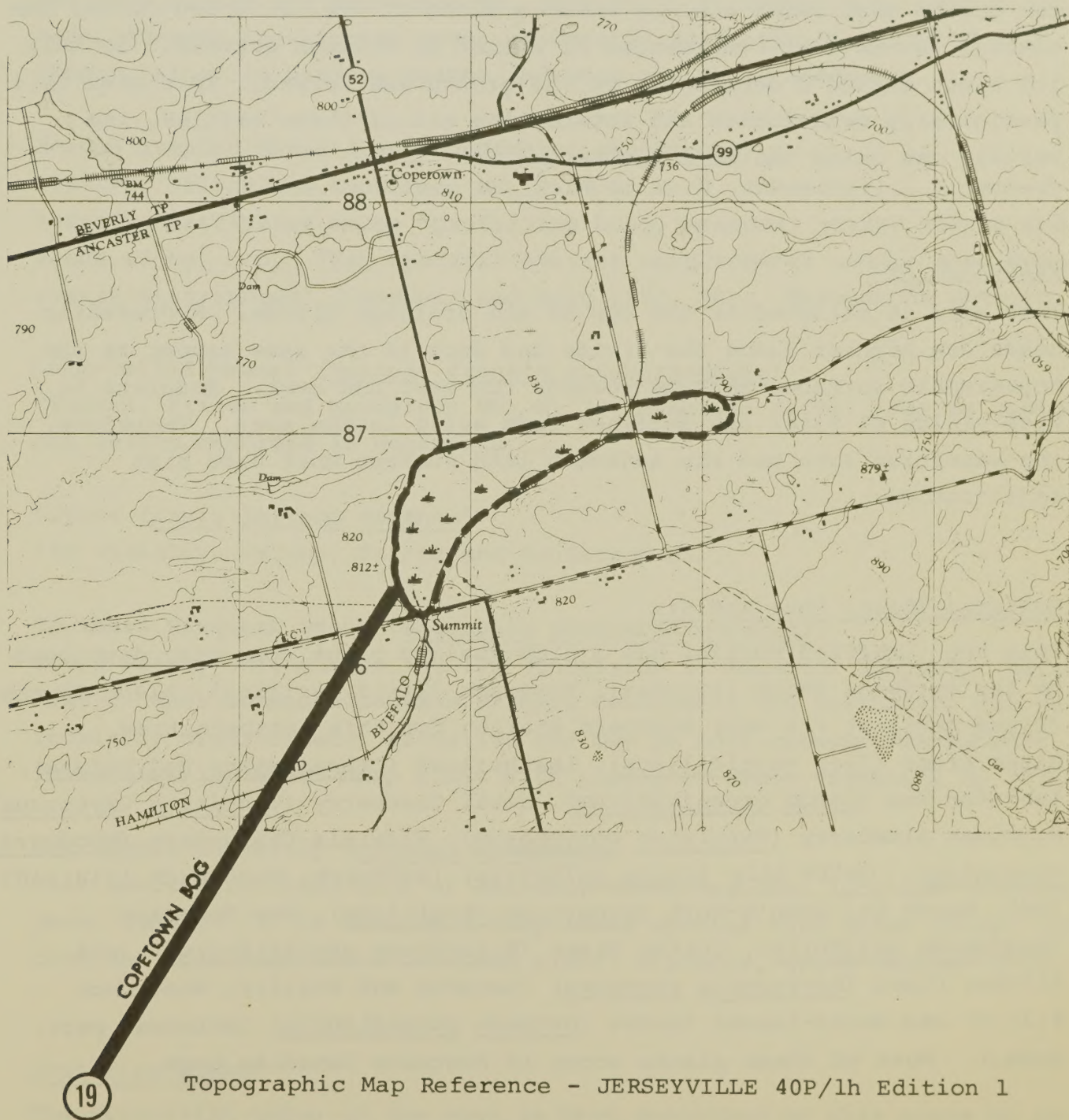
According to analyses made recently, the peat in Summit Bog began to accumulate about 9200 years ago. At the bottom of the kettlehole clear across the bog, the peat is structureless (amorphous) and green-grey in colour. The thickness of this layer varies from 1-2 feet in depth. From the top of this layer to about 6 feet below the surface, a fibrous matrix is added to the structureless component. Some of the fibre is derived from sedges, but much of it originates from axes derived from mosses. The chief moss constituent is Hypnum, not Sphagnum as many might suspect. Sphagnum stems become common about 6 feet below the surface when the peat becomes woody through the presence of woody fibres of ericaceous plants. About a foot and a half below the surface, the peat though fibrous and woody as to framework is predominantly liquid. Though these three kinds of peat are generally present and can be found anywhere in the bog, they vary in amount from place to place.

ecologistics limited

The pollen studies show that in the area for the first several thousand years balsam, spruce and pine were dominant. The last of the balsam firs occurred when the level of the bog was about a yard lower than it is at present. About six yards down from the surface, the occurrence in the neighbourhood of oaks was recorded and their popularity on the landscape increased rapidly from there on. The palynologists are now trying to check the identification of juniper pollen which occurs in unusual abundance at intervals. Despite the early popularity of the balsam fir or spruce and the pines, after the first couple of thousand years pollen of the following genera can always be found: Fagus, Acer, Tilia, Juglans, Castanea, Liquid Ambar, Nyssa Populus, Alnus and Fraxinus. In the central and upper regions of the peat Ulnus, Carva, and Batula were transient. (Radforth, Wood Duck 17(8):101-104).

The underlying deposits are glaciolacustrine shallow water sediments and Halton till. The poorly drained bogs are level but the intervening areas have slopes up to 9%.

Nearby wells penetrate many feet of well-defined silt, sand and gravel layers, up to depths of 120 feet. The wells produce fresh water with an average specific capacity of 2. The porous nature of the sediments around the sensitive area makes infiltration very likely. Whether the local groundwater regime discharges into the kettles at depth is unknown.



ecologistics limited

1976

CRITERIA FULFILLED - 1, 2, 3, 4, 6 and 8

Criterion One

The Copetown Bog has formed in a kettle. This is an undrained hole in the ground that marks a place where a block of ice, stranded during the glacial retreat, was surrounded or buried by outwash gravels. As this ice block melted a depression in the ground was formed. This area is a particularly well-formed and interesting set of three kettles, the western one being the most studied.

Criterion Two

This area is situated at the top of the drainage divide. Hydrostatic heads are highest along the divide and drop in the same manner as the topographic surface, that is towards the east and west. Moderate to high yields of water are obtained from wells in the area. Therefore, the sensitive area and the adjacent land surface must have high infiltration.

Criteria Three, Four and Six

This bog (confined muskeg) has a high quality plant community developed on its surface, which includes: Tamarack (Larix laricina), Black Spruce (Picea mariana) - a very southern station for this northern tree, Black Alder (Ilex verticillata), Leatherleaf (Chamaedaphne calyculata), Labrador Tea (Ledum groenlandicum), Small Cranberry (Vaccinium Oxycoccus), Highbush Blueberry (Vaccinium corymbosum), Virginia Chain-Fern (Woodwardia virginica), Calla Lily (Calla palustris) (Radforth, Wood Duck 17(8):101-104), Marsh St. John's-Wort (Hypericum virginicum), Bog Rosemary (Andromeda polifolia), Cotton Grass (Eriophorum angustifolium), and Pitcher Plant (Sarracenia purpurea) (Lewarne and Smillie, Wood Duck 6(2):5) and Round-leaved Sundew (Drosera rotundifolia) (McLaren, pers. comm.). Most of these plants occur in northern Canadian bogs.

This type of bog community is unique in the Region, with the exception of some sections of the Beverly and Fletcher Creek Swamps.

Several of the above mentioned species of plants are rare in the Region. Some uncommon mammals and reptiles are:

Star-nosed Mole (Condylura cristata cristata)

(Warren, Prince and Henderson MS, farm of R. J. Inksetter). While not rare, towards the extreme south of Ontario sparingly distributed or absent, since it prefers swamps and bogs and mucky meadows.

Meadow Jumping Mouse (Zapus hudsonius canadensis)

(Warren, Prince and Henderson MS, Farm of R. J. Inksetter). A rather-locally distributed mouse, preferring boggy meadows, grassy stream and woods edges, etc. "Has specific habitat requirements and is thus not evenly-distributed" (Campbell and Dagg 1972, 36). Throughout Ontario.

Long-tailed Weasel (Mustela frenata noveboracensis)

(Warren, Prince and Henderson MS, R. J. Inksetter Farm). May be commoner, but seldom recorded in Wentworth.

Coyote (Canis latrans thamnias)

(In vicinity, Warren, Prince and Henderson MS).

Northern Ringneck Snake (Diadophis punctatus edwardsi)

Found nearly adjacent at lot 32, concession 2, Ancaster Township (Martin 1950). Most common along the Niagara Escarpment and northward, but irregularly distributed. Secretive and may be more common than known; favours well-wooded, damp sites with plenty of cover (Campbell MS 1975).

Bog Copper Butterfly (Lycaena epixanthe)

This species is found here at its only known Regional location (McLaren, pers. comm.). It is usually a very local species that never strays far from the acid bogs where its food plant, Cranberry, grows (Klots, 1951).

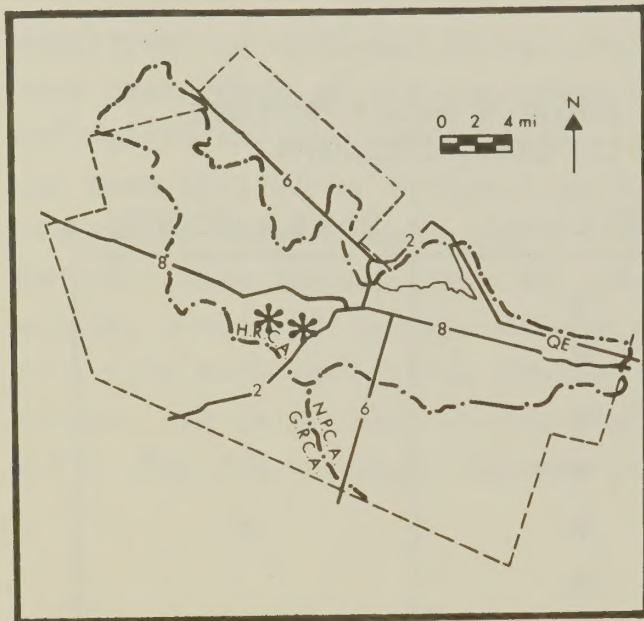
Criterion Eight

The scientific value of the area is best described by this quote by Dr. Norman W. Radford (Wood Duck, 17(8):102), then the Chairman of the Biology

Department of McMaster University: "The writer and his associates have long been aware of the botanical interest that Summit Bog held for naturalist and scientist alike. The muskeg that the kettlehole encloses has been visited by naturalists from many parts of Ontario and by scientists and engineers from several countries in the world. The bog (confined muskeg) over the years has become a major reference entity, a sort of dynamic museum piece which has been, and could remain, as a site convenient for ecological examination and continued investigation. It is because of its convenience, characteristics and reference value that its complete documentation has been encouraged".

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION	•	
ACTIVE RECREATION	•	
EXTENSIVE FORESTRY	•	
INTENSIVE FORESTRY	•	
AGRICULTURE	•	•
EXTENSIVE LAND DEVELOPMENT	•	
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•



NAME

Dundas Valley

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

A

OWNERSHIP

Public (Hamilton-Wentworth Regional Municipality and Hamilton Region Conservation Authority) and Private.

SIZE

6,000 acres

LOCATION

West of the Towns of Dundas and Ancaster.

GENERAL DESCRIPTION

The Valley resulted from pre-glacial erosion which cut deeply into the Niagara Escarpment. Later the glaciers eroded the surface further and rocky, unstratified material was deposited by the advancing and retreating ice lobes covering this area. The oscillating ice margin created glacial lakes between ice lobes and the exposed land spillways, glaciolacustrine deposits and shoreline features in the Valley are part of these depositions of glacial waters.

The lower section of the Valley is part of a glacial end moraine with gravelly depositions and intermittent proglacial lake terraces. Stream bank erosion and slippage can be seen in various areas. The middle part of the Valley is a rough area of glacial deposits with a kame and kettle land form, and drainage is blocked in places.

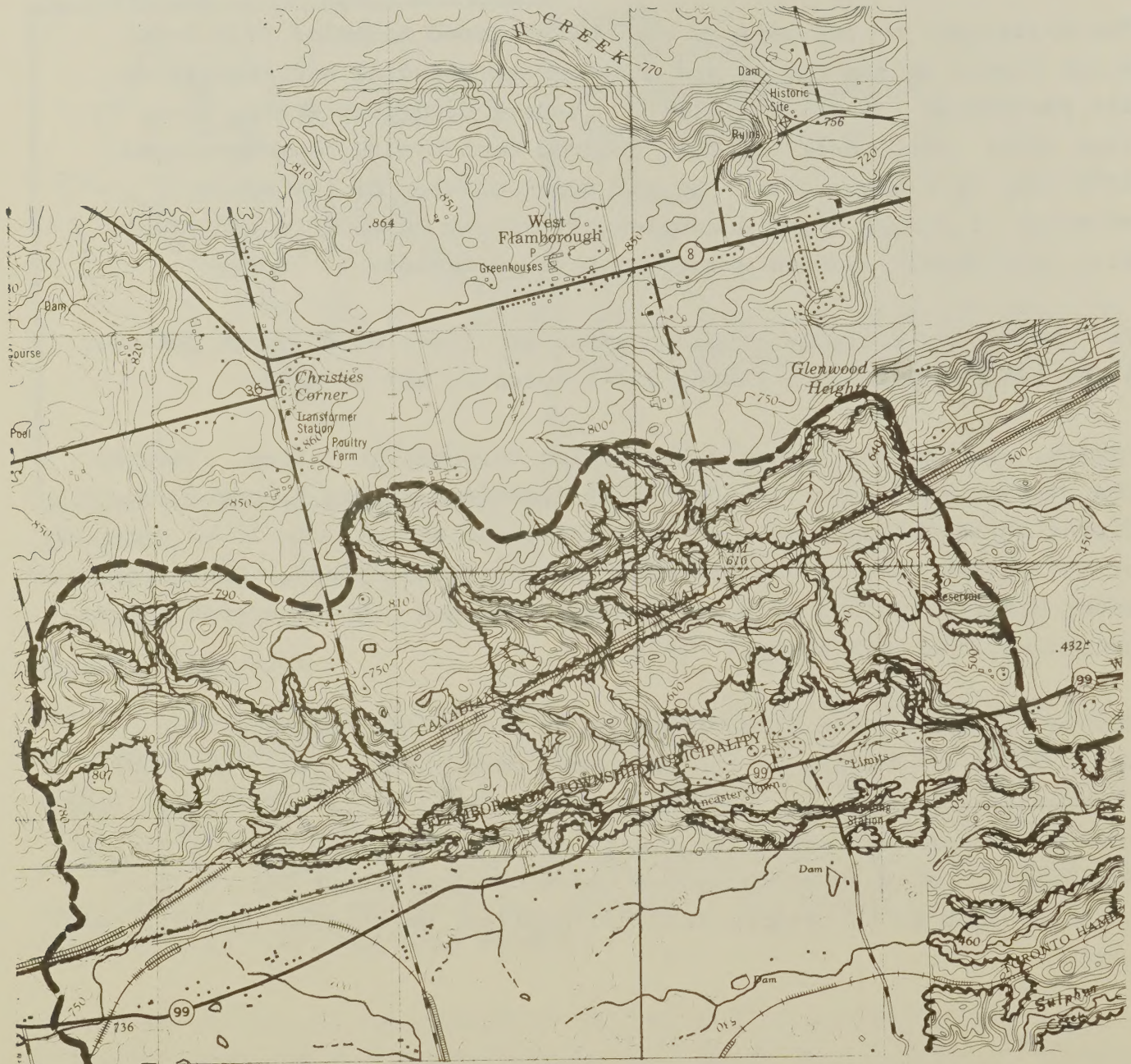
The upper section of the Valley is characterized by glaciolacustrine land forms. The sides of the Valley are defined by the Niagara Escarpment which disappears under the deep glacial deposits.

The major soil of the area is the well-drained Ancaster silt loam, which formed on the ridges and moraines surrounding and separating the ravines of the Dundas Valley. It developed from silty, clay, loam till. Small areas of well-drained Oneida clay loam developed from clay till also occur. In the upper portion of the valley, adjacent to Spring Creek a complex of Grimsby sandy loam and Brant silt loam developed from water-deposited material.

The valley has a highly complex system of slopes which range between 10 to 15% but with some ravine sides reaching 30% or more.

Spring, Sulphur and Ancaster Creek flow through the valley. Because the streams are fast-flowing, little flooding appears to occur except during spring breakup of ice which sometimes affects the lower part of the Valley (Hamilton-Wentworth Planning Board, 1968). The streams water quality is good with low temperatures and high dissolved oxygen concentrations (MNR surveys, 1973).

The Valley contains a high diversity of ecological habitats many of which contain elements of the southern, Carolinian, flora and fauna (Travers, pers. comm.). Many areas are highly unique and contain many species of rare and sensitive plants and animals. The Skunk's Misery forests are rated as being one of the most significant natural communities left in the Region (Shivas, McLaren, Wormington, Dowall, pers. comm.).



DUNDAS VALLEY

Topographic Map Reference - MOUNT HOPE 30M/4e Edition 3
JERSEYVILLE 40P/1h Edition 1
WESTOVER 40P/8a Edition 2
DUNDAS 30M/5d Edition 3

Military Grid Reference - 820875

20



SCALE 1 : 25,000

1 Mi

ecologistics limited

1976



20

Topographic Map Reference - MOUNT HOPE 30M/4e Edition 3
JERSEYVILLE 40P/1h Edition 1
WESTOVER 40P/8a Edition 2
DUNDAS 30M/5d Edition 3

Military Grid Reference - 820875



SCALE 1 : 25,000
0 1 Mi

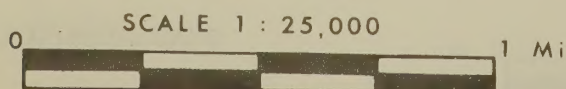
ecologistics limited

1976



Topographic Map Reference - MOUNT HOPE 30M/4e Edition 3
JERSEYVILLE 40P/1h Edition 1
WESTOVER 40P/8a Edition 2
DUNDAS 30M/5d Edition 3

Military Grid Reference - 820875



ecologistics limited

1976

CRITERIA FULFILLED - 1, 2, 3, 4, 5, 6, 7, 8 and 9

Criterion One

The Dundas Valley with its deep, wooded ravines, moraines, raised shore-lines, high hills and varied topography is a set of distinctive and unusual landforms.

Criterion Two

Many complications arise when trying to determine groundwater flow regimes within the Dundas Valley. Hummocky and steeply dipping topography composed of irregular and discontinuous deposits of clastics add to confusion when attempting to understand details.

The overall picture seems to be more obvious. Groundwater is generally flowing from a divide coinciding with the basin boundary toward the base of the valley. It is suspected that insignificant amounts of groundwater come from outside the basin. Therefore the specific areas within the valley with high infiltration should be given special notice since they contribute all the groundwater. Porous soil zones are probably the most significant mappable units in the area. They provide initial infiltration, slowing down lateral movement of water to a point where it can more easily seep into interlying silts and sands. Even if the soil zone is underlain by clay, the dip of the topography is such that water will migrate along the contact and eventually either discharge into streams or encounter a porous medium. Although relatively permeable materials occur on the surface in the upper basin area, well records indicate numerous clay layers at depth. This provides a condition for the development of a complex multi-layer flow regime.

This sensitive area fulfills the hydrogeologic criteria for a sensitive area in that a considerable portion of its area provides high infiltration to an aquifer system that is not recharged from outside its boundaries.

Criteria Three, Four, Five and Six

These four criteria are described in an effort to avoid descriptive overlap. Many of the wooded areas are of high quality and relatively undisturbed.

The Valley contains many species that are found in Canada only within the Carolinian life zone. The varied topography and the resultant soils, slope, moisture and incident sunlight variations, the southern location and the land use history has produced an area with very high biological diversity. Some of the distant communities include: upland deciduous forest, upland (north-facing) coniferous forest, river, floodplain deciduous forest, upland conifer plantation, working and abandoned orchards, farms plus all ages of ecological succession, on a variety of sites, ranging from grass fields, through old fields, young forest to climax forest. There are forests that may never have been logged (Travers, pers. comm.).

As a result of the conditions described above and the extensive size of the natural forests many otherwise rare and endangered species still survive and prosper in the valley.

Some of the more significant plants are: Long-spurred Violet (Viola rostrata), Northern Downy Violet (Viola fimbriatula) (McLaren, pers. comm.), Marsh Blue Violet (Viola cucullata) (Pringle, pers. comm.), Robin-Plantain (Erigeron pulchellus), Grass-of-Parnassus (Parnassia glauca), Partridgeberry (Mitchella repens), Foamflower (Tiarella cordifolia), Pennsylvania Bittercress (Cardamine pennsylvanica), Golden Ragwort (Senecio aureus), Indian Cucumber-Root (Medeola virginiana), Spicebush (Lindera benzoin), Water Avens (Geum rivale), Sassafras (Sassafras albidum) - a Carolinian tree, Turtlehead (Chelone glabra), Water-Pennywort (Hydrocotyle americana), Great Lobelia (Lobelia siphilitica), Showy Tick-Trefoil (Desmodium canadense), Honewort (Cryptotaenia canadensis), Spurred Gentian (Halenia deflexa) - only station in Region, of Provincial significance, Shinleaf (Pyrola elliptica), Sweet Chestnut (Castanea dentata) - a very rare native tree, Flowering Dogwood (Cornus florida) - a Carolinian shrub,

Silvery Spleenwort (Athyrium thelypteroides), (McLaren, pers. comm.)
and Showy Ladies' Slipper (Cypripedium reginae) (Dowall, pers. comm.).

The following description of individual species supports the supposition that the Valley contains: high quality ecological communities, unusual habitats, high diversity of species and rare species. Only the rare, sensitive species of mammals, herptiles and birds that are known to occur in the Dundas Valley are discussed here.

Least Shrew (Cryptotis parva parva)

1.25 miles northeast of McMaster and 1 mile from town of Dundas (Warren, Prince and Henderson MS). Adult male collected in June 1947, in high-grass open area by main highway, in Meadow Vole colony. Further trapping here failed to take more, and whereabouts of specimen unknown now (ROM). An amazing occurrence, since only other Canadian locality is Long Point (Banfield 1974, 26).

Southern Flying Squirrel (Glaucomys volans volans)

(Gartshore MS 1974). Auchinburn Farm only definite locality for the county. Highest densities in mature beech-maple and oak-hickory woods (Banfield 1974, 144). Throughout Southern Ontario to Ottawa area.

Ermine or Short-tailed Weasel (Mustela erminea cicognanii)

(Gartshore MS 1974). Auchinburn Farm one of two definite localities for county. Throughout Ontario, but scarcer in south, where Long-tailed Weasel is commoner.

Long-tailed Weasel (Mustela frenata noveboracensis)

(Warren, Prince and Henderson MS). One of a few definitely-recorded occurrences in Wentworth County, but may be common.

Mink (Mustela vison vison)

(Gartshore MS 1974). Auchinburn Farm.

Coyote (Canis latrans thamnoides)

(Gartshore MS 1974). Auchinburn Farm.

Bobcat (Lynx rufus, subspecies probably rufus)

(Warren, Prince and Henderson MS). Recorded by a reliable naturalist and local residents c. 1945-1950 in vicinity of Ancaster. Extensive rocky, wooded ravines may have allowed it to survive here and not elsewhere in surrounding area. Requires large range, but can survive on edge of civilization (Peterson 1966, 286).

Mink Frog (Rana septentrionalis)

Introduced at Auchinburn Farm (Gartshore MS 1974). This northern frog of cold waters favours inlets and outlets, with water-lillies. It may persist if competition with Bullfrog is minimal (Campbell MS 1975).

Pickerel Frog (Rana palustris)

Found at lot 37, concession 2, Ancaster Township by Martin (1950). A locally-distributed and possibly-declining frog of cool waters such as streams in gorges; warm water and pollution seldom tolerated by this delicate species (Campbell MS 1975). One of 3 recorded Wentworth locales.

Red-Bellied Snake (Storeria occipitomaculata occipitomaculata)

Auchinburn Farm (Gartshore MS 1974). A small, secretive species and probably commoner, but recorded at only 3 Wentworth localities. More common northward.

(Melanistic) Eastern Garter Snake (Thamnophis sirtalis sirtalis)

Lot 39, concession 2, Ancaster Township (Martin 1950). This colour form usually confined to Lake Erie; only Wentworth site.

Northern Ribbon Snake (Thamnophis sauritus septentrionalis)

Auchinburn Farm (Gartshore MS 1974). More common perhaps in the heavily glaciated kettle-kame terrain of southwestern Ontario, and relatively restricted in Wentworth.

Northern Ringneck Snake (Diadophis punctatus edwardsi)

Auchinburn Farm (Gartshore MS 1974). Most common along the Niagara Escarpment and northward, but irregularly-distributed. Secretive and may be more common than known; favours well-wooded, damp sites with plenty of cover (rocks, logs, etc). (Campbell MS 1975).

Eastern Smooth Green Snake (Opheodrys vernalis vernalis)

Auchinburn Farm (Gartshore MS 1974) and lot 37, concession 2, Ancaster Township (Martin 1950). Difficult to find among green vegetation and perhaps often overlooked, but locally-distributed. Prefers semi-open upland areas (Conant 1975, 185).

Cooper's Hawk (Accipter cooperii)

(Auchinburn Farm - Gartshore, 1974). Nests in woodland, high in a tree (Godfrey, 1966). This hawk is rare in southern Ontario especially as a breeding species. This is the only known Regional nesting location and under no circumstances should development or more likely, nature photographers, be allowed to disturb the nesting area.

Virginia Rail (Rallus limicola)

(Auchinburn Farm - Gartshore, 1974). This species nests in freshwater marshes (Godfrey, 1966). With the loss of shoreline marsh in the last 200 years, in this Region, this bird has declined, like many other marsh species. It nested in surprisingly small scraps of marsh left in the industrial area of Hamilton in the 1960's (ONRS). Only four known Regional nesting areas.

Whip-poor-will (Caprimulgus vociferus)

(Auchinburn Farm - Gartshore, 1974). The eggs are laid on bare ground on leaf litter in ungrazed woodlands of various developments, especially those with openings (Godfrey, 1966). This bird is known from four Regional stations but there may be a fair number throughout the north end of the Region (Curry, pers. comm.).

Least Flycatcher (Empidonax minimus)

(Auchinburn Farm - Gartshore, 1974). The habitat includes: open deciduous or mixed woodland, forest edges, and openings, deciduous second growth, woodlots, copses, orchards, suburban shade trees, city parks, and alder thickets. Nests are built in a upright crotch of a tree or shrub usually 5 to 25 feet above the ground (Godfrey, 1966). Two breeding stations are known for sure but indications are that it is a scarce but regular breeder throughout the northern woods of Flamborough Township (Curry, pers. comm.).

Cliff Swallow (Petrochelidon pyrrhonota)

(Martin Farm near Dundas - large colony - North, pers. comm., Auchinburn Farm - Gartshore, 1974, Dowall - Wood Duck 5(1):10). Highly colonial mud nests are built on cliffs, canyons and often on man-made structure such as concrete bridges and culverts. Birds then forage widely over water, marshes and open land (Godfrey, 1966). This uncommon bird, with a spotty distribution is found in three places in the Region. It is not necessarily sensitive to development

Blue-gray Gnatcatcher (Polioptila caerulea)

(Dundas Valley - North, pers. comm., Wormington, pers. comm., Auchinburn Farm - Gartshore, 1974). The small nest is saddled on a limb or placed in the fork of a branch anywhere from 10 to 60 feet above the ground, but usually quite high. It is found most often well up in mature trees, but may be found also in low thickets and small growth (Godfrey, 1966). An uncommon southern bird that is found in only 3 stations.

Loggerhead Shrike (Lanius ludovicianus)

(Auchinburn Farm - Gartshore (1974)). Prefers open country with hedge-rows, copses, scattered trees or tall shrubs, telephone poles and wires, and fence posts where adequate lookout posts and thorny trees for nesting (Godfrey, 1966). This species has recently suffered a population collapse in southern Ontario and the Canadian Wildlife Service is now investigating the problem. This is the only known breeding station but there are unconfirmed recent summering records for Glanbrook Township (Smith, pers. comm.).

Yellow-throated Vireo (Vireo flavifrons)

(Skunk's Misery - Wormington, pers. comm., Mineral Springs - Nest found - Wood Duck 29(2):36). The nest is suspended from a fork in a tree branch. Prefers open stands of mature deciduous trees, often in residential areas, foraging in upper stratum (Godfrey, 1966). This uncommon species is found in only two stations in the Region.

Philadelphia Vireo (Vireo philadelphicus)

(Auchinburn Farm - Gartshore, 1974). The suspended nest can be found in a deciduous tree or tall shrub from 10 to 45 feet up. Found in open mixed and deciduous woodland, woods edges, aspen parklands, second growth and burntlands and logged areas, thickets of alder and willow (Godfrey, 1966). This breeding record is far south of the normal range in Ontario (Godfrey, 1966) and should be checked.

Golden-winged Warbler (Vermivora chrysoptera)

(Dundas Valley - throughout valley - Curry, pers. comm., Auchinburn Farm - Gartshore, 1974), Sulphur Springs - nest, 6 eggs - Wood Duck 13(1):18, Skunk's Misery - 17 males, June 12, 1971 - Wormington pers. comm., Skunk's Misery - nest with 5 young - Wood Duck 25(3):39). Habitat is shrubby wastes, old bushy pastures, bushy edges and openings in deciduous woodland, shrubby borders of streams. The nests are on the ground in ferns or weed stalks (Godfrey, 1966). Only 3 nesting stations are known but the bird is probably more common than so indicated, in Flamborough Township (Curry, pers. comm.).

Blue-winged Warbler (Vermivora pinus)

(Auchinburn Farm - Gartshore, 1974, Sulphur Springs - nest with 6 eggs - Wood Duck 13(1):18, Skunk's Misery - 3 males June 12, 1971 - Wormington, pers. comm., Skunk's Misery - 1 young out of nest - Wood Duck 25(3):39). Habitat is brushy neglected fields and pastures, woodland openings and edges, and thickets along streams and swamps. Nests are placed on or very near the ground, usually among vegetation (Godfrey, 1966). This uncommon southern warbler is found in 3 areas in the Region.

Black-throated Green Warbler (Dendroica virens)

(Auchinburn Farm - Gartshore, 1974). In breeding season the bird is found in more open coniferous and mixed woods. Nesting is usually, but not always, in conifers, both small and large and at various heights (Godfrey, 1966). This is one of two Regional nesting areas but a more detailed search for breeding areas should be undertaken.

Cerulean Warbler (Dendroica cerulea)

(Skunk's Misery - Wormington pers. comm.). In the nesting season this species can be found in mature deciduous woodland, foraging and singing high in the trees. Nests are placed in a branch of a tree from 25 to 60 feet up (Godfrey, 1966). Each of the three Regional stations probably only contain one pair of birds (Curry, pers. comm.) of this species. This bird nests in Canada only in southern Ontario (Godfrey, 1966).

Chestnut-sided Warbler (Dendroica pensylvanica)

(Skunk's Misery - Nest with 2 eggs - June 12, 1971 - Wormington, pers. comm., Skunk's Misery - Nest with 1 egg - Wood Duck 25(3):40, Auchinburn Farm - Gartshore, 1974). Preferred habitat is open bushy second growth and thickets, deciduous, on both dry and moist ground. Nests are placed in sapling, low bush or vine, usually 1 to 3 feet up (Godfrey, 1966). One of only three breeding areas.

Pine Warbler (Dendroica pinus)

(Skunk's Misery - Wormington, pers. comm., Sulphur Springs - Curry, pers. comm.). Found in pine woodlands in the nesting season with the nest placed from 10 feet upwards from the ground (Godfrey). An uncommon warbler of big pines that was once common around Hamilton (McIlwraith, 1886). One of only 2 Regional nesting areas but may be more common than this indicates (Curry, pers. comm.).

Louisiana Waterthrush (Seiurus motacilla)

(Skunk's Misery - Nest with 5 young - June 12, 1971 - Wormington, pers. comm., nest with adult and 1 young out of nest - Wood Duck 25(3):4, known in this vicinity since 1886 - MacIlwraith, 1886). The bird requires undisturbed natural forests that contain a fast flowing river or stream in a deep ravine or a mountainous condition, for its breeding habitat (Godfrey, 1966, C. Woods, pers. comm.). Therefore it is found in our area where streams pour over the Niagara Escarpment into wooded gorges. We know of 10 breeding stations for this species in Canada of which five are in this Region (Wormington, pers. comm.). These stations are: 3 escarpment areas in Halton County (Wormington, pers. comm.), 1 escarpment falls in Niagara Region (Meyers, pers. comm.) and 1 area near London,

Ontario (Godfrey, 1966). Therefore half the known Canadian breeding areas are in the Hamilton-Wentworth Region.

Mourning Warbler (Oporornis philadelphia)

(Skunk's Misery - Wormington, pers. comm.). The ground nest is placed in tangles of briery shrubs or other low vegetation. Habitat is shrubbery and bushes of young second growth on burntlands and clearings; woodland edges and sunny openings; margins of bogs and marshes (Godfrey, 1966). This uncommon warbler of lowland, open forests is found in only 5 areas in the Region.

Yellow-breasted Chat (Icteria virens)

(Sulphur Springs - singing each year including 1975 - Curry, pers. comm.). Habitat is thickets and tangles of tall shrubbery beside streams or ponds, in old overgrown bushy clearings and in similar situations where it can keep out of sight (Godfrey, 1966). There are probably only 6 to 10 pairs in the entire Region (Curry, pers. comm.). These breeding areas are significant because they are north of the recognized breeding range for eastern Canada (Godfrey, 1966).

Canada Warbler (Wilsonia canadensis)

(Skunk's Misery - 4 adults found in the height of the breeding season - June 12, 1971 - Wormington, pers. comm.). Habitat is shrubbery undergrowth of woodlands, tall shrubbery such as alder and willow along streams, swamps, and similar moist places. Nests placed on or near the ground under a sapling, in a mossy hummock, on a mossy stump or log, in a bank cavity, or among the roots of an upturned tree (Godfrey, 1966). This species should be looked for carefully to determine its breeding status more definitively. One of two known summering stations.

Orchard Oriole (Icterus spurius)

(Sulphur Springs - 3 young out of nest - June 28, 1971 - Wood Duck 25(3):42, 3 nests found per year in Dundas Valley and near Ancaster - Curry, pers. comm.). This bird nests in scattered trees about gardens orchards and shade trees. It avoids heavily forested regions (Godfrey, 1966). This rare southern bird is found only in the Dundas Valley and Ancaster and likes the semi-natural development that occurs in these areas (Curry, pers. comm.).

Swamp Sparrow (Melospiza georgiana)

(Auchinburn Farm - Gartshore, 1974). Nests are placed in a tussock of marsh vegetation or low in a bush and in breeding season the bird is found in wetlands solely (Godfrey, 1966). Only four known breeding stations are known but is this bird really this rare?

Trout Perch (Percopsis amiscomaycus)

(MNR (1973) station 10). This small fish (3 to 6 inches in size) is usually a lake species in Eastern Canada but is found in shallow, often turbid streams in western Canada. It spawns in early spring and enters streams to do so. It is a very important forage fish for larger predatory fish (Scott and Crossman, 1973). The occurrence of the Trout Perch in a stream in eastern Canada is quite unusual.

Black Dash Skipper (Atrytone conspicua)

(Found between the railroad and the floodplain - McLaren, pers. comm.). This species is quite local and is found in marshes and boggy meadows (Klots, 1951). This is the only breeding location in the Region and only one of three breeding locations in Ontario (McLaren, pers. comm.).

Two Spotted Skipper (Atrytone bimacula)

(Found between the railroad and the floodplain - McLaren, pers. comm.). The relatively unknown species is found in boggy or marshy meadows (Klots, 1951). This is a very rare skipper (McLaren, pers. comm.).

Variegated Fritillary (Euptoieta claudia)

(Found in the woods north of Skunk's Misery - McLaren, pers. comm.). This species is found in eastern United States and is uncommon or rare north of Virginia, Illinois, and Minnesota and is common southward (Klots, 1951). This sighting is probably at the only station in the Region for this rare southern butterfly (McLaren, pers. comm.).

Criterion Seven

The Dundas Valley is large, around 6,000 acres, but large sections of it have been disturbed by past land-use activities. Never-the-less

there are many natural areas that are in an essentially undisturbed condition. As shown by the extensive list of rare species presented earlier the valley contains habitat for many species that are intolerant of human disturbance.

Criterion Eight

The Hamilton Region Conservation Authority presently maintains the Resource Management Centre for use by various educational institutions. A successful and busy staff provides a varied interpretation program for organized school visitors and for individuals.

The Valley's natural resources, topography, history and location near to the cities make it particularly suitable for both conservation education and scientific research.

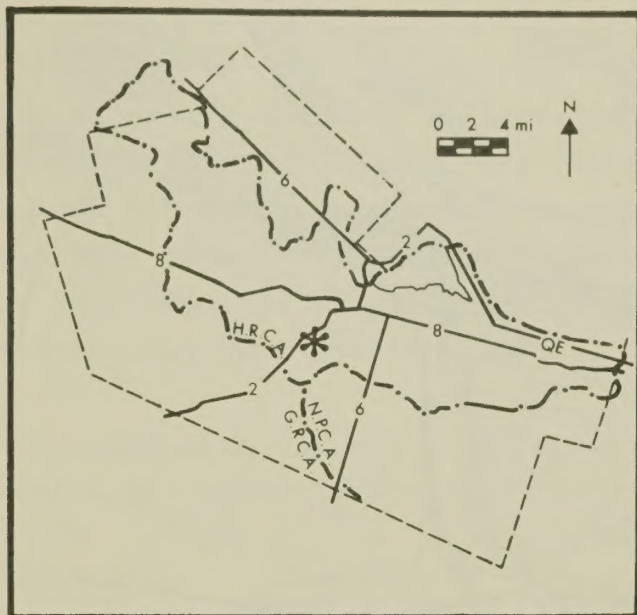
Criterion Nine

The hilly, wooded valley wedged between two cliffs of white limestone is an esthetic delight. The farms provide a patchwork of grass and crops among the forests. The winding, unimproved roads are ideal candidates for scenic road status and very similar to the beautiful old roads found in the Boyne and Beaver Balleys, of Dufferin and Grey Counties.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY	•	
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT	•	
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•

The above matrix is applied with a broad brush to the entire valley. The wide variety of communities and conditions that occur here means that a certain impact will cause effects in many different ways. Some areas are suitable for scattered home development but some areas would be destroyed even with high levels of passive forms of recreation. Therefore it is essential that each planned land-use change be looked at individually and in connection with other secondary effects of that change, within the context provided by the information in this study.



NAME

Tiffany Falls

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Public (Hamilton Region Conservation Authority) and Private

SIZE

220 acres

LOCATION

On the eastern edge of the urban area of Ancaster, west of Highway 403.

GENERAL DESCRIPTION

This heavily forested section of the Niagara Escarpment contains Tiffany Falls, on the Ancaster Creek. The area provides an important green space link between the Hamilton Mountain Escarpment on the east and the Dundas Valley on the north.

The western half of the area contains ravines. The eastern section has soils of the well-drained Ancaster silt loam and Oneida clay loam. These have developed from silty clay and clay loam till.

The slopes of the area are very steep. The ravine slopes range from 15 to 30% but in places slopes over 30% occur.

HAMILTON — WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

AREA
NO .

21



21

Topographic Map Reference - MOUNT HOPE 30M/4e Edition 3

Military Grid Reference - 848875



SCALE 1 : 25,000

1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 1, 4 and 6

Criterion One

The Niagara Escarpment is a geological landform extending over 380 miles through southern Ontario. In the Hamilton area it is present as a prominent topographic bedrock feature with a vertical drop of over 200 feet. The most common expression of the escarpment is the mantled scarp, formed as a consequence of differential erosion of resistant caprock and softer underlying rocks (Hewitt, 1971).

A typical rock outcrop shows most of the Silurian history. From top to bottom the commonly occurring rock units are as follows:

<u>Period</u>	<u>Formation</u>	<u>Composition</u>	<u>Erodibility</u>	<u>Function</u>
Silurian	Guelph	Buff Dolomite	Low	Resistant Layer
Silurian	Guelph-Eramosa Member	Black Shale Black Dolomite	Low	Resistant Layer
Silurian	Goat Island Gasport	Grey Dolomite	Low	Resistant Layer
Silurian	Cabot Head	Greenish Grey and Red Silty Shale	High	Undercut Easily
Silurian	Whirlpool	Orthoquartzitic Sandstone	Low to Moderate	
Ordovician	Queenston	Red Shale	High	Undercut Easily

Criteria Four and Six

High quality, native forest on the lip of limestone cliffs is found in several areas of this Region but is uncommon within Ontario. The creek and resultant waterfalls along with the scenic beauty, geological interest and ecological conditions add important dimensions to the local area.

Louisiana Waterthrush (Seirus motacilla)

(Tiffany falls - 3 young out of nest, with 2 adults and nest - June 22, 1969 - North, pers. comm., Dowall - Wood Duck 8(9):6). The bird requires undisturbed natural forests that contain a fast flowing river or stream

in a deep ravine or a mountainous condition, for its breeding habitat (Godfrey, 1966, C. Woods, pers. comm.). Therefore it is found in our area where streams pour over the Niagara Escarpment into wooded gorges. We know of 10 breeding stations for this species in Canada of which five are in this Region (Wormington, pers. comm.). These stations are: 3 escarpment areas in Halton County (Wormington, pers. comm.), 1 escarpment falls in the Niagara Region (Meyers, pers. comm.) and 1 area near London, Ontario (Godfrey, 1966). Therefore half the known Canadian breeding areas are in the Hamilton-Wentworth Region.

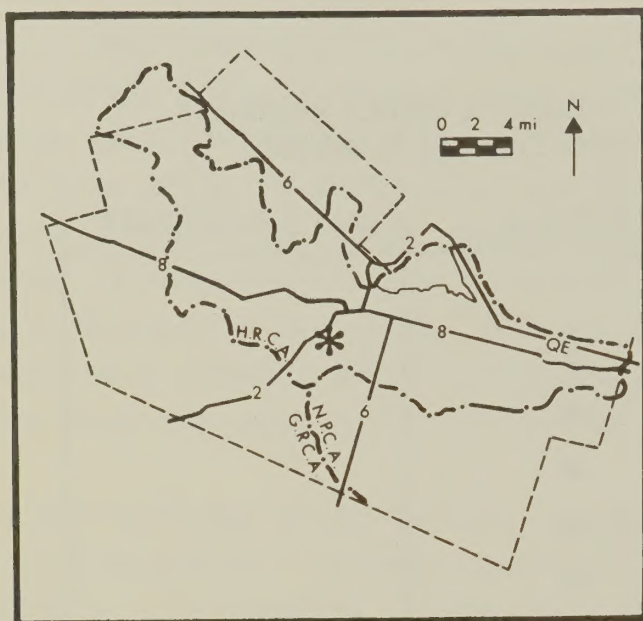
Black-throated Green Warbler (Dendroica virens)

(Tiffany Falls - singing males heard in June in conifers, Curry, pers. comm.). In breeding season the bird is found in more open coniferous and mixed woods. Nesting is usually (not always) in conifers, both small and large and at various heights (Godfrey, 1966). This is one of two Regional nesting areas, but a more detailed search for breeding areas should be undertaken.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION	•	
EXTENSIVE FORESTRY	•	
INTENSIVE FORESTRY	•	
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT	•	
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•

The steep slopes are very susceptible to erosion.



NAME

Hamilton Mountain (Radial Line)

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

A

OWNERSHIP

Private (at present)

SIZE

365 acres

LOCATION

On the eastern edge of the Town of Ancaster just south of Highway 403.

GENERAL DESCRIPTION

The Hamilton Mountain Sensitive Area is also known as the Radial Line or Allarco Property. It is a mixture of biological habitats and ecological succession stages that has been of interest to local outdoor enthusiasts.

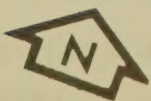
The surficial deposits are thin lacustrine clay and silt over silty clay loam till. The major soil is the well-drained Ancaster silt loam developed on silty clay loam till. Small areas of Alberton silt loam occur along the drainage depressions. Slopes above the escarpment are in the 9 to 15% range. In the south of the area they are in the 15 to 30% range.



22

Topographic Map Reference - MOUNT HOPE 30M/4e Edition 3

Military Grid Reference - 860876



SCALE 1 : 25,000
0 1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 1, 3, 5, and 6

Criterion One

The Niagara Escarpment is a geological landform extending over 380 miles through southern Ontario. In the Hamilton area it is present as a prominent topographic bedrock feature with a vertical drop of over 200 feet. The most common expression of the escarpment is the mantled scarp, formed as a consequence of differential erosion of resistant caprock and softer underlying rocks (Hewitt, 1971).

A typical rock outcrop shows most of the Silurian history. From top to bottom and commonly occurring rock units are as follows:

<u>Period</u>	<u>Formation</u>	<u>Composition</u>	<u>Erodibility</u>	<u>Function</u>
Silurian	Guelph	Buff Dolomite	Low	Resistant Layer
Silurian	Guelph-Eramosa Member	Black Shale Black Dolomite	Low	Resistant Layer
Silurian	Goat Island Gasport	Grey Dolomite	Low	Resistant Layer
Silurian	Cabot Heat	Greenish Grey and Red Silty Shale	High	Undercut Easily
Silurian	Whirlpool	Orthoquartzitic Sandstone	Low to Moderate	
Ordovician	Queenston	Red Shale	High	Undercut Easily

Criterion Three

The plant communities are diverse in nature and are of high quality in their species composition and abundance. The Sweet Chestnut tree (Castanea dentata) was once common but was virtually eliminated by a fungus disease near the beginning of this century. One large specimen (15 inches diameter at breast height) of this species can be found at the east side of this area (Gilmore, pers. comm.). Sassafras (Sassafras albidum) trees are found in the same general area as the Chestnut. This Carolinian species is uncommon in the Region. Native Crab Apple (Pyrus

coronaria) and Black Walnut (Juglans nigra) are also found.

Blue-winged and Golden-winged Warblers nest here and the rare Brewster's hybrid has been found (Wood Duck 22(2):23, C. Wood, pers. comm.).

Criteria Five and Six

The property has an unusually high diversity of biological communities and the associated plants and animals. Some of the plant communities include: old pasture successional vegetation; cat-tail marsh; alder swamp; abandoned apple orchard; fern (calcareous bog); stream; second growth, upland, deciduous forest; recently cultivated fields; Christmas tree plantation; intermittent ponds; field succession on a very dry habitat (old gravel pit) (Pringle, 1971) and the communities found along the lip of the limestone cliffs of the Niagara Escarpment.

The diversity of the communities and their relative quality is indicated by the rare and sensitive creatures that are able to survive there. These creatures include:

Masked Shrew (Sorex cinereus cinereus)

(Warren, Prince and Henderson MS). Base of Mountain among trees along creek bed. Common throughout Ontario, but more sparingly distributed in extreme south. High humidity and heavy ground cover are usual requirements (Banfield 1974, 9).

Smoky Shrew (Sorex fumeus fumeus)

(ROM #32616). Trapped in hardwood forest near Sanitorium, top of Mountain, 1948. Not recorded much in lower reaches of province (Peterson 1966, 37). Prefers cool, damp, shady areas (ibid., 38) and mature forest (Banfield 1974, 17).

Timber Rattlesnake (Crotalus horridus horridus)

Formerly occurred here (Campbell MS 1975) but now probably extinct throughout Ontario. However, if any survived, would be protected by provincial endangered species legislation.

Short-billed Marsh Wren (Cistothorus platensis)

(Hamilton Mountain - nest with 6 young - Wood Duck 25(3):38). Habitat is moist grass and sedge marshes, bogs and damp meadows, often with a scattering of low bushes and often bordering willows or alders. The nest is a ball of grass well hidden in the upright grass or sedge to which it is attached, with an entrance to the side (Godfrey, 1966). One of two known Regional locations but may be found on wet meadows in Flamborough Township (North, pers. comm.).

Red-headed Woodpecker (Melanerpes erythrocephalus)

(Nest in this woods - Hanna, pers. comm.). The nests are excavated in the dead wood of a tree, telephone pole, or fence post. The habitat of open woods, burntlands, groves and scattered trees in open places is general and widespread (Godfrey, 1966). This is one of five known breeding locations. However, other pairs may be scattered through Glanbrook Township (Curry, pers. comm.).

Golden-winged Warbler (Vermivora chrysoptera)

(Hamilton Mountain - Pringle, 1971, Wormington, pers. comm.). Habitat is shrubby wastes, old bushy pastures, bushy edges and openings in deciduous woodland, shrubby borders of streams. The nests are on the ground in ferns or weed stalks (Godfrey, 1966). Only 3 nesting stations are known but the bird is probably more common than so indicated, in Flamborough Township (Curry, pers. comm.).

Blue-winged Warbler (Vermivora pinus)

(Hamilton Mountain - Wormington, pers. comm., Pringle, 1971). Habitat is brushy neglected fields and pastures, woodland openings and edges, and thickets along streams and swamps. Nests are placed on or very near the ground, usually among vegetation (Godfrey, 1966). This uncommon southern warbler is found in 3 areas in the Region.

Mourning Warbler (Oporornis philadelphia)

(Hamilton Mountain - Radial Line - Wood Duck 25(3):4). The ground nest is placed on tangles of briery shrubs or other low vegetation. Habitat is shrubbery and bushes of young second growth on burntlands and clearings;

woodland edges and sunny openings; margins of bogs and marshes (Godfrey, 1966). This uncommon warbler of lowland, open forests is found in only 5 areas in the Region.

Yellow-breasted Chat (Icteria virens)

(Hamilton Mountain - Wormington, pers. comm., Pringle, 1971). Habitat is thickets and tangles of tall shrubbery beside streams or ponds, in old overgrown bushy clearings and in similar situations where it can keep out of sight (Godfrey, 1966). There are probably only 6 to 10 pairs in the entire Region (Curry, pers. comm.). These breeding areas are significant because they are north of the recognized breeding range for eastern Canada (Godfrey, 1966).

Tawny Cresent Butterfly (Phyciodes batesii)

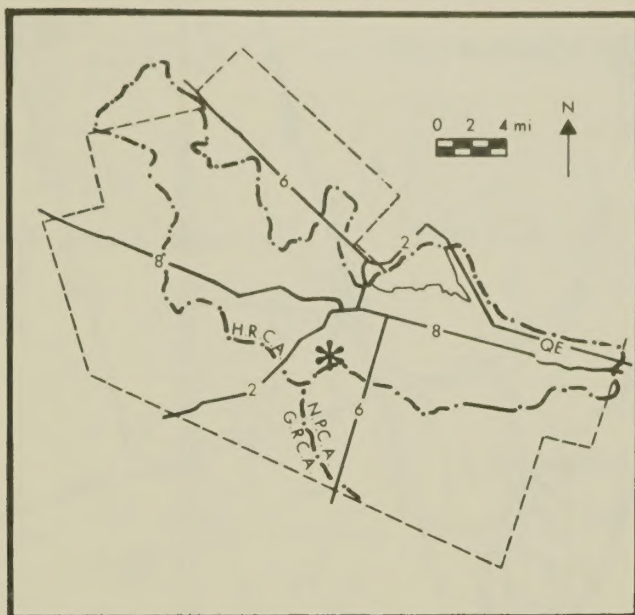
This rare, local species is found here. It occurs commonly here but is not found elsewhere in the Region (Wormington, pers. comm.).

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY	•	
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT	•	
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•

Some forms of active recreation, such as that associated with various all-terrain vehicles, can have significant negative effects upon the existing natural communities. Other types have associated facilities that require extensive manipulation or removal of the sensitive features such as the land clearing necessary for placement of a baseball diamond.

The surface silt loam of the Ancaster soils erode very readily on steep slopes, such as are found here, if they are left exposed.



NAME

Ancaster Creek Headwaters

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Private

SIZE

143 acres

LOCATION

On the eastern edge of the Town of Ancaster.

GENERAL DESCRIPTION

There is a mixture of old fields, early succession stage forest and mature forest. Nearby urban development and the accessory urban fringe activities such as trail bike riding have possibly damaged the existing natural communities.

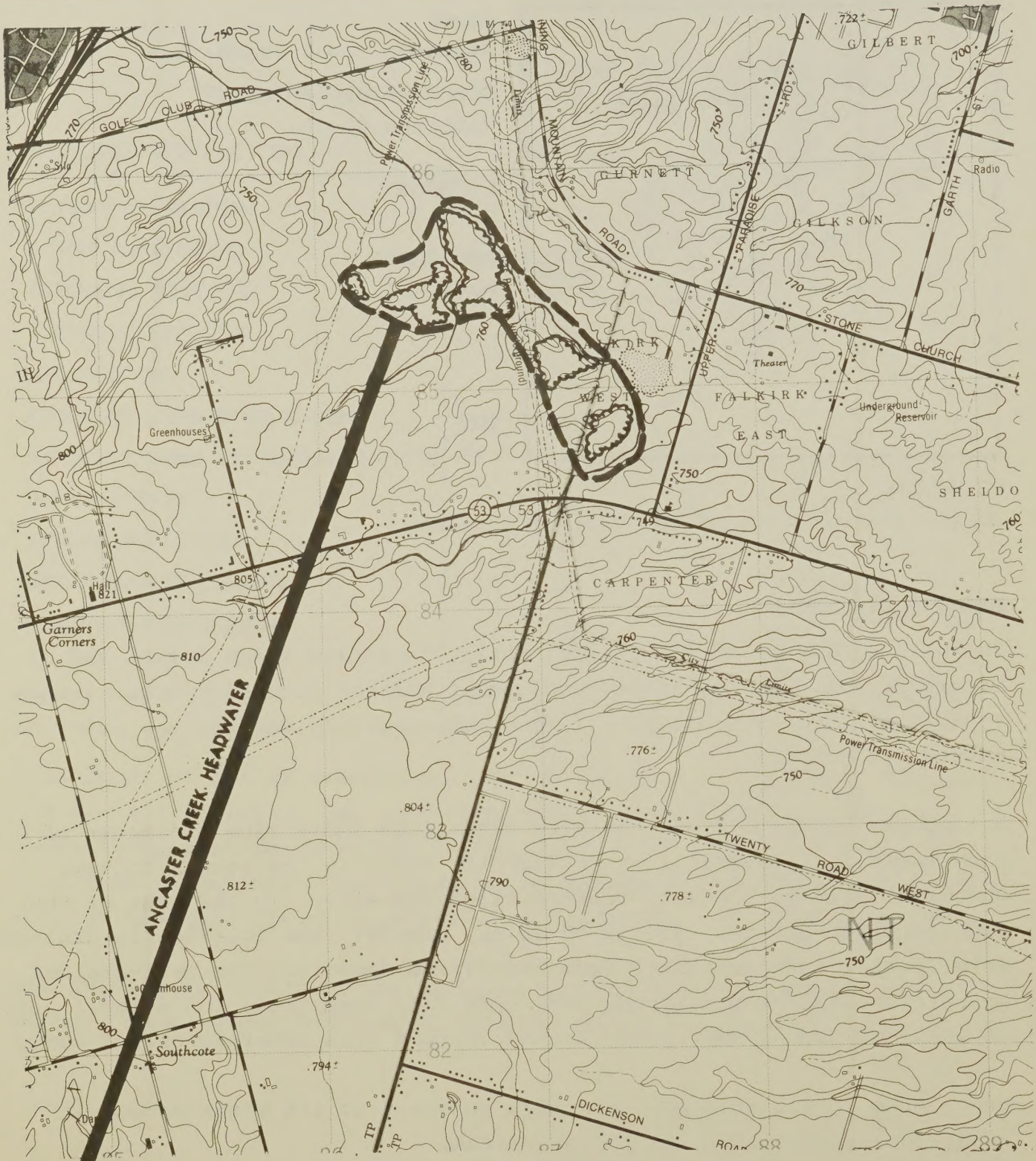
The surficial deposits of the area are mainly lacustrine sediments of clay and silt. Recent alluvium deposits occur in the stream bottom. The major soil is the well-drained Brant deposits. To the east of the area occurs a greater variety of soils, namely: the imperfectly-drained Beverly silt loam developed from lacustrine deposits; the well-drained Ancaster silt loam developed from silty clay loam till, and a small area of well-drained Grimsby sandy loam developed from water-deposited sands.

The slopes of the area are generally in the 9 to 15% slope range with greater steepness adjacent to the stream.

HAMILTON — WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

AREA
NO .

23



23

Topographic Map Reference - MOUNT HOPE 30M/4e Edition 3

Military Grid Reference - 870854

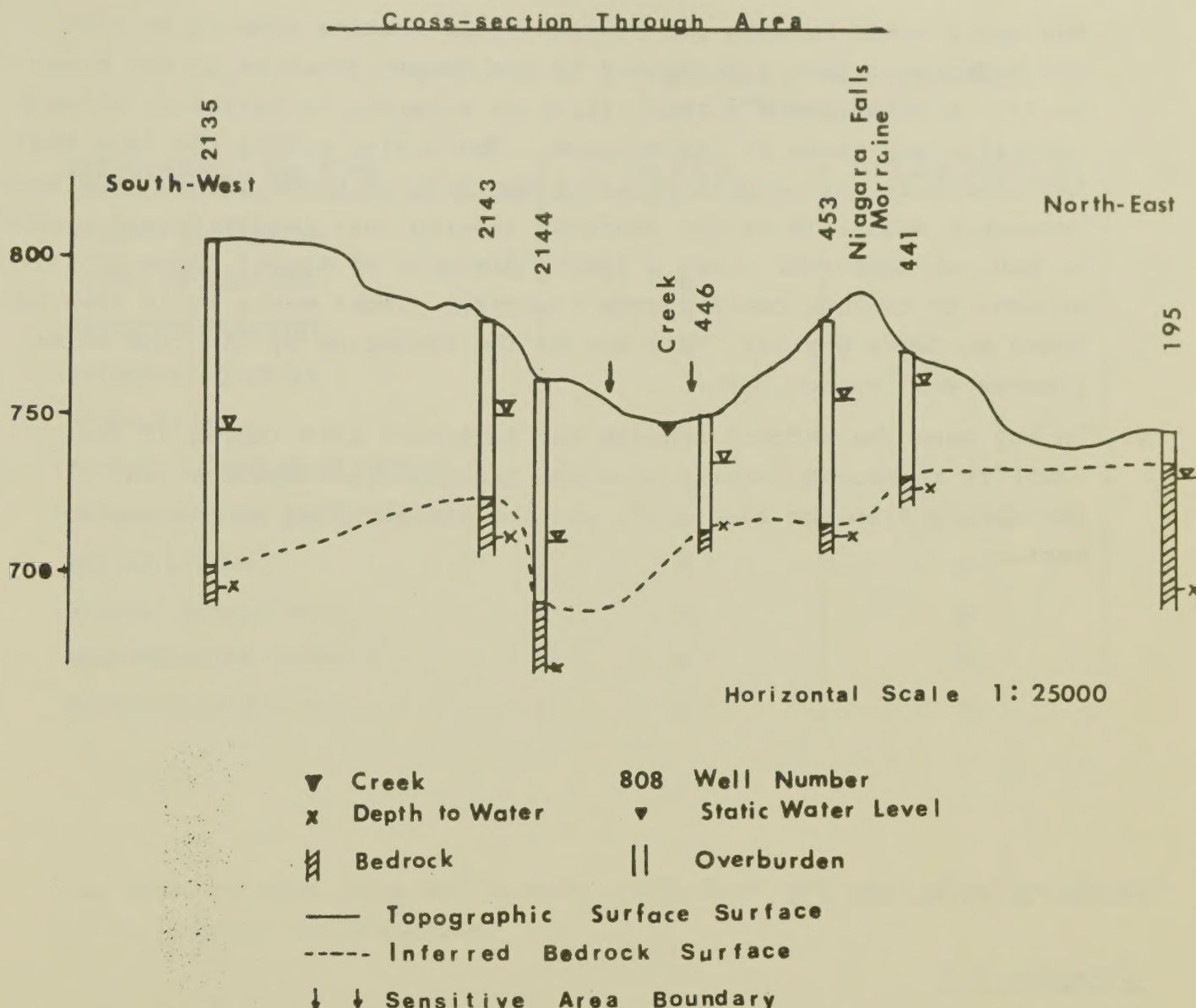


SCALE 1 : 25,000

1 Mi

ecologistics limited

1976



A few observations can be made from the cross section for the area.

1. The study area represents a topographical lowland.
2. A small bedrock valley exists beneath the present creek location.
3. The highland area to the right is the Niagara Falls moraine.
4. The consistency of the pressure head (approximately 35 feet) for most wells may be reflecting the consistency or homogeneity, of the fractured bedrock.

5. The water table beneath the Niagara Falls moraine sits on or near the bedrock surface, as opposed to its deeper location in the other wells. This suggests a possibility of moderate infiltration through the silts and sands of the moraine. There also exists the idea that this water favours migration along the bedrock slope through the more permeable materials at the contact, losing only insignificant amounts to bedrock fractures. Over a longer distance of travel these contributions to bedrock could become important. Most water would then be found at lower depths. This may be the situation by the time water reaches well number 2144.
6. In any case the bedrock beneath the sensitive area (about 50 feet down) is recharged locally from the Niagara Falls moraine and regionally from the sand plain and the bedrock high in the southwest.

CRITERION FULFILLED - 6

Criterion Six

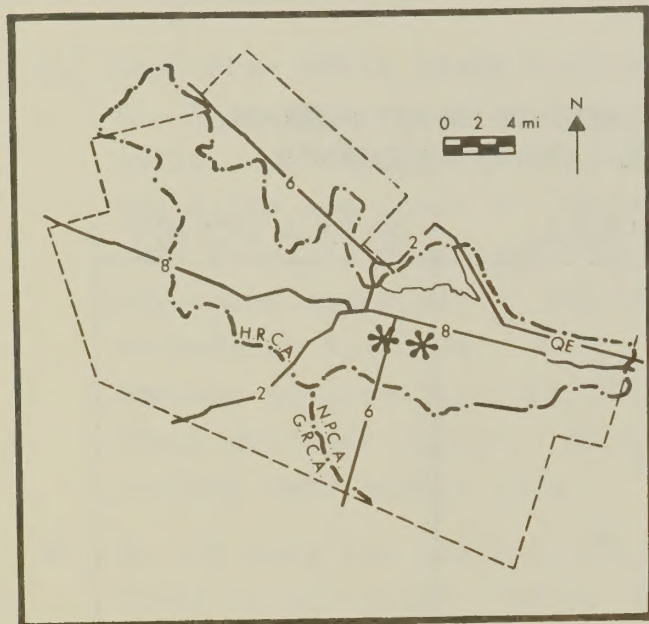
Four-toed Salamander (Hemidactylium scutatum)

Probably the National Museum of Canada's Ancaster specimen (#13836), collected during the breeding season (April), 1963 came from springs or trickles near valley headwaters, the usual habitat of this scarce, very localized salamander. It prefers sphagnum moss. Sphagnaceous areas adjacent to woods are common habitats, and so are boggy woodland ponds. The Fourtoe is terrestrial when adult (like Woodland Salamanders); but its larvae are aquatic (like Dusky Salamanders) (Conant 1975, 282). This is the only known Regional station.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION	•	
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•

The Ancaster silt loam and Grimsby sandy loam are very prone to erosion if the surface is disturbed.



NAME

Hamilton Niagara Escarpment

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Private and public

SIZE

490 acres

LOCATION

Passes through the heart of the city of Hamilton.

GENERAL DESCRIPTION

The Niagara Escarpment in Hamilton is a thin strip of green that passes through the center of the urban area. In many areas reservoirs, roads, expressways and railways have cut through the greenbelt, but nevertheless in the local context the view of the escarpment forest is important.

A natural area surrounded by altered habitat, such as that of a residential community, resembles an island from the point of view of species restricted to natural habitats.

The number of species that a natural area can hold at equilibrium is a function of its area and its isolation. Larger areas and areas located close to other natural areas can hold more species (Diamond, 1975). Therefore it is important that strips of natural vegetation are allowed to remain connecting disjunct natural areas. The Hamilton Niagara Escarpment is a green belt that interconnects important natural areas on both side of Hamilton. It connects the Red Hill Creek - King's Forest area in the east to the Hamilton Mountain (Radial Line), Tiffany Falls and Dundas Valley areas in the west. The City of Hamilton has a system of important environmentally sensitive areas that are well connected by greenspace on escarpment and river valleys.

ecologistics limited

HAMILTON — WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

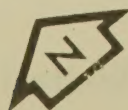
AREA
NO **24**



24

Topographic Map Reference - MOUNT HOPE 30M/4e Edition 3
MOUNT ALBION 30M/4f Edition 3

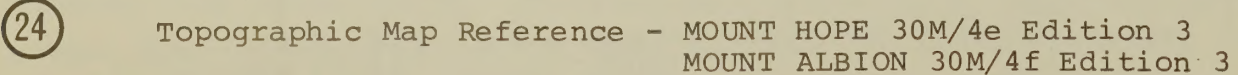
Military Grid Reference - 915884



SCALE 1 : 25,000
0 1 Mi

ecologistics limited

1976



1 Mi

1976

CRITERIA FULFILLED - 1, 6 and 9

Criteria One and Nine

The Niagara Escarpment is a unique landform in Ontario and the Hamilton-Wentworth Region is fortunate in having it pass through its urban areas. The escarpment, its forests and its dominant presence upon the landscape are well worth protecting. The lip of the escarpment provides excellent views of the City of Hamilton and Lake Ontario. The city view is particularly interesting at night. From the lower city the escarpment provides a pleasing textured background to a person's observations to the west. Within the urban area the esthetic value of the escarpment is significant.

Criterion Six

Smoky Shrew (Sorex fumeus fumeus)

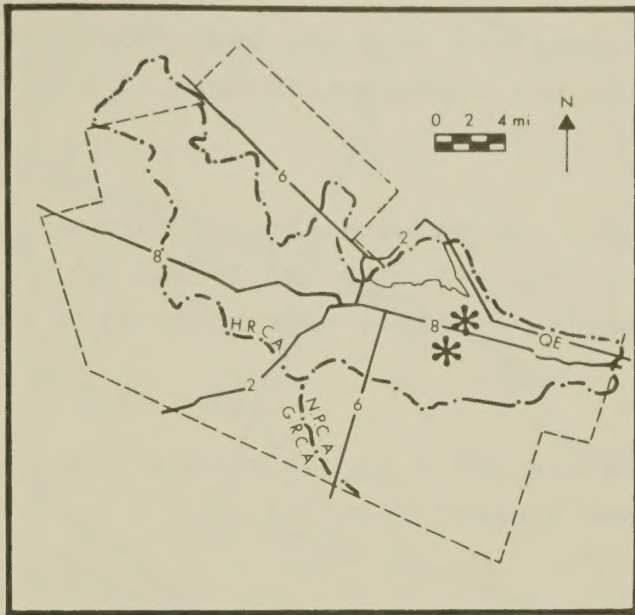
(ROM #32631). Often prefers rocky, mossy, shaded, damp areas in mature forest (Banfield 1974, 17) and rarely recorded in southwestern Ontario near Lake Erie (Peterson 1966, 37).

Spotted Turtle (Clemmys guttata)

(Chedoke Escarpment and Ravine). May no longer occur here on golf course property since drainage changed (Campbell MS 1975). Bogs, especially along Lakes Erie and Huron, are favoured habitat of this scarce and endangered species, which prefers cool, clean waters (Campbell 1971).

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE		
EXTENSIVE LAND DEVELOPMENT	•	
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION		
GROUNDWATER CHANGES		
RESOURCE EXTRACTION	•	•



NAME

Red Hill Creek - King's Forest

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

A

OWNERSHIP

Private and Public (Hamilton Region Conservation Authority and City of Hamilton)

SIZE

1,264 acres

LOCATION

On the east side of Hamilton extending from Mount Albion on the Niagara Escarpment through valleys and ravines to the river mouth at Hamilton Harbour.

GENERAL DESCRIPTION

Red Hill Creek pours over Albion Falls into a steep-sided river valley. At this point there is a notch in the escarpment that was probably carved by a large river, prior to the last glaciation. About one half of the area is wooded with a wide variety of trees. Much of this forest is to be found on the Escarpment and valley slopes. The other half is composed of pastures, old fields and orchards that are slowly growing back into forest.

Redhill Creek has poor water quality (Department of Energy and Resources Management, 1968; Dillion Ltd., 1975), especially in its lower reaches.

Groundwater follows a moderate gradient into the valley from the west and south-southeast. Considerable amounts probably eventually seep from the bedding planes on the escarpment face and produce springs. Wells on the top of the escarpment generally produce reasonable supplies of water from dolomite bedrock. Areas of high infiltration probably occur randomly, above the escarpment, where bedrock lies near the surface and is sufficiently fractured. Hydrogeologic relationships within the

valley are significant in that water discharges from the escarpment feeds the small creeks. Infiltration is not important because of the presence of Halton till.

Halton till is the main surficial deposit, along with the alluvium of the creek. Oneida loam has developed on the till. A small area of Binbrook soil has developed from lacustrine deposits over clay till between the two ravines to the east.

The slopes are complex and generally within the 9 to 15% range. The creek and escarpment ravines have slopes steeper than 15%.

HAMILTON — WENTWORTH REGION ENVIRONMENTALLY SENSITIVE AREAS STUDY

AREA
NO .

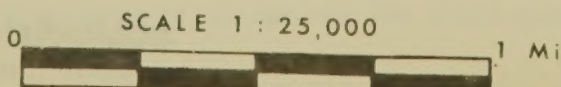
25



Topographic Map Reference - MOUNT ALBION 30M/4f Edition 3

Military Grid Reference - 973854

25



ecologistics limited

1976

CRITERIA FULFILLED - 1, 2, 3, 5, 6 and 9

Criterion One

This area contains the unique landforms of the Niagara Escarpment and a large Pleistocene re-entrant. The upper escarpment is well exposed showing the Lockport, Clinton and Cataract rock groupings. The lower units are covered by thick deposits of Halton till.

Criterion Two

The Red Hill Creek - King's Forest ecological system provides a very important ecological function in that it is a link between various other similar systems. It is one part of the Niagara Escarpment east-west chain of cliff forests. It also links the escarpment with Hamilton Harbour and the Lake Ontario shore via the Red Hill Creek ravine and its associated woods and fields.

The importance of linking natural biological communities by strips of similar habitats has recently been pointed out by extensive work on the biogeography of islands (Diamond, 1975). It has been shown that islands have lower number of species than areas of similar size on a continent. Therefore, if a piece of a large forest is surrounded by some hostile environment, such as a city, then the number of species will decline from the original conditions, even if the remaining forest piece is left completely alone by man (Diamond, 1975).

Criteria Three and Six

The biological communities are varied and the presence of many unusual creatures that are sensitive to development indicates that areas of high quality ecosystem exist. Some of these records are old and should be field checked because development may have altered some important conditions. Some of the species mentioned are Regionally rare.

Prairie Deer Mouse (Peromyscus Maniculatus bairdii)

(ROM map, 200). Only recorded Wentworth locality is Mt. Albion. A common mouse in open lands throughout southern Ontario, to Lake Huron and western Lake Ontario (Banfield 1974, map 70).

Red-backed Salamander (Plethodon cinereus cincereus)

The rare all-red (phase) of this very common species has been collected here (Brown 1928). Only Wentworth location for phase?

Pickerel Frog (Rana palustris)

Found in creek here by Brown (1928). A scarce and possibly declining frog of cool waters such as streams in gorges; warm water and pollution seldom tolerated by this delicate species (Campbell MS 1975). One of 3 recorded Wentworth localities.

Norther Water Snake (Natrix sipedon sipedon)

(Hamilton Region Conservation Authority, 1975). A refuge for this fairly common but much persecuted and often locally-eliminated snake.

Northern Ribbon Snake (Thamnophis sauritus septentrionalis)

Many reported here by Hamilton Region Conservation Authority, 1975. More common perhaps in the heavily glaciated kettle bog-kame terrain of southwestern Ontario, and relatively restricted in Wentworth.

Smoky Shrew (Sorex fumeus fumeus)

(Buttermilk Falls, ROM #32607). Stones in and along creek, a typical habitat being wet, mossy rocks in mature forest (Banfield 1974, 17). Rarely recorded in southwestern Ontario towards Lake Erie (Peterson 1966, 37).

Short-eared Owl (Asio flammeus)

(Albion Falls - nested in fields north of there - found by P. Henderson-North, pers. comm.). Nests are placed on the ground in open places. Habitat is open grassland, grassy or bushy meadows, fresh and salt marshes, bogs, low-arctic tundra (Godfrey, 1966). This is the only known Regional nesting record but the birds have not been seen for some time and are considered to be Regionally extinct as a breeder (North, pers. comm.).

Long-eared Owl (Asio otus)

(Red Hill Creek - Mount Albion - nester there - Copeland, pers. comm., Wood Duck 8(6):12-13, found there in 1968 - ONRS). The nests are in woodland, usually 10 to 30 feet up in a tree in an old hawk or crow nest. The habitat is usually the denser parts of woods (not necessarily extensive) the preferred being coniferous or mixed woods (Godfrey, 1966). This is one of six Regional nesting stations but the birds are probably no longer present in Westdale Park.

Criterion Five

The variety of soils, slopes, incident sunlight and moisture levels has enabled a high diversity of biological communities to develop. Much of the area is escarpment, steep hill or ravine slope and these exposures face the sunlight at many different angles. This combined with the variety of moisture levels in the soils, produce a multitude of microclimates. Different plants have different ecological requirements and therefore a high diversity of microclimates allow a high diversity of plant life to grow and prosper.

Some of the more uncommon plants, that represent a wide variety of ecological requirements, are: Ground Cedar (Lycopodium complanatum), Hairy Bush - Clover (Lespedeza hirta), Shinleaf (Pyrola elliptica), Night-flowering Catchfly (Silene noctiflora), Anise-root (Osmorhiza longistylis), Common Stitchwort (Stellaria graminea), Pointed-leaved Tick-Trefoil (Desmodium glutinosum), Vetch (Vicia tetrasperma), Spring Vetch (Vicia sativa), Pokeweed (Phytolacca americana), Great Lobelia (Lobelia siphilitica), Michigan Lily (Lilium michiganense), and Green Violet (Hybanthus concolor) (McLaren, pers. comm.).

Criterion Nine

The area has high aesthetic value in the context of the surrounding landscape. Mount Albion provides an impressive view of the Red Hill Creek Valley and the nearby urban areas of Hamilton and Stoney Creek. At the same time this rural-natural landscape provides very pleasant views for the urban residents as they travel around the area.

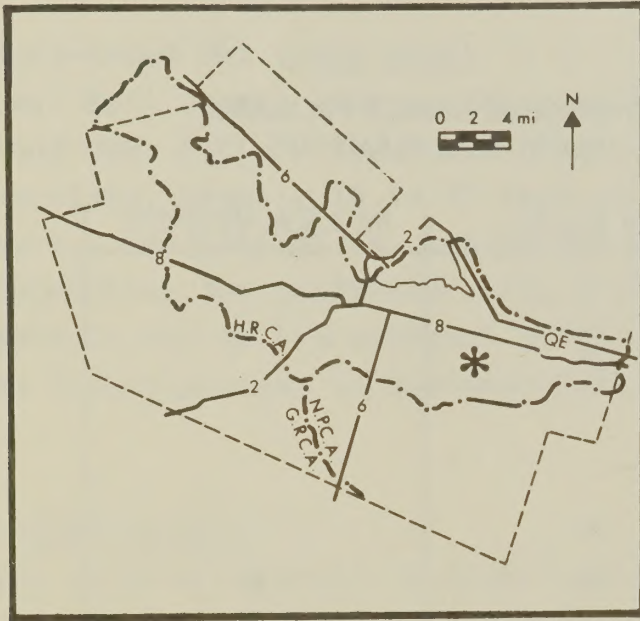
NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION	●	
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT	●	●
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

It is essential that a comprehensive field study be done in the Red Hill Creek Valley in order to accomplish several objectives: 1) assess existing impact of recent urban development near the valley, 2) provide detailed environmental information that can be applied to future planning decisions 3) predict the effects of direct future urban development and its secondary effects.

Upstream urban development will affect the water runoff quantities and frequencies. Increased runoff will cause bank erosion and destabilization problems downstream. This potential problem should be investigated.

The steep slopes will start to erode if the existing vegetation is disturbed.



NAME

Felker's Falls and Niagara Escarpment

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

A

OWNERSHIP

Private

SIZE

182 acres

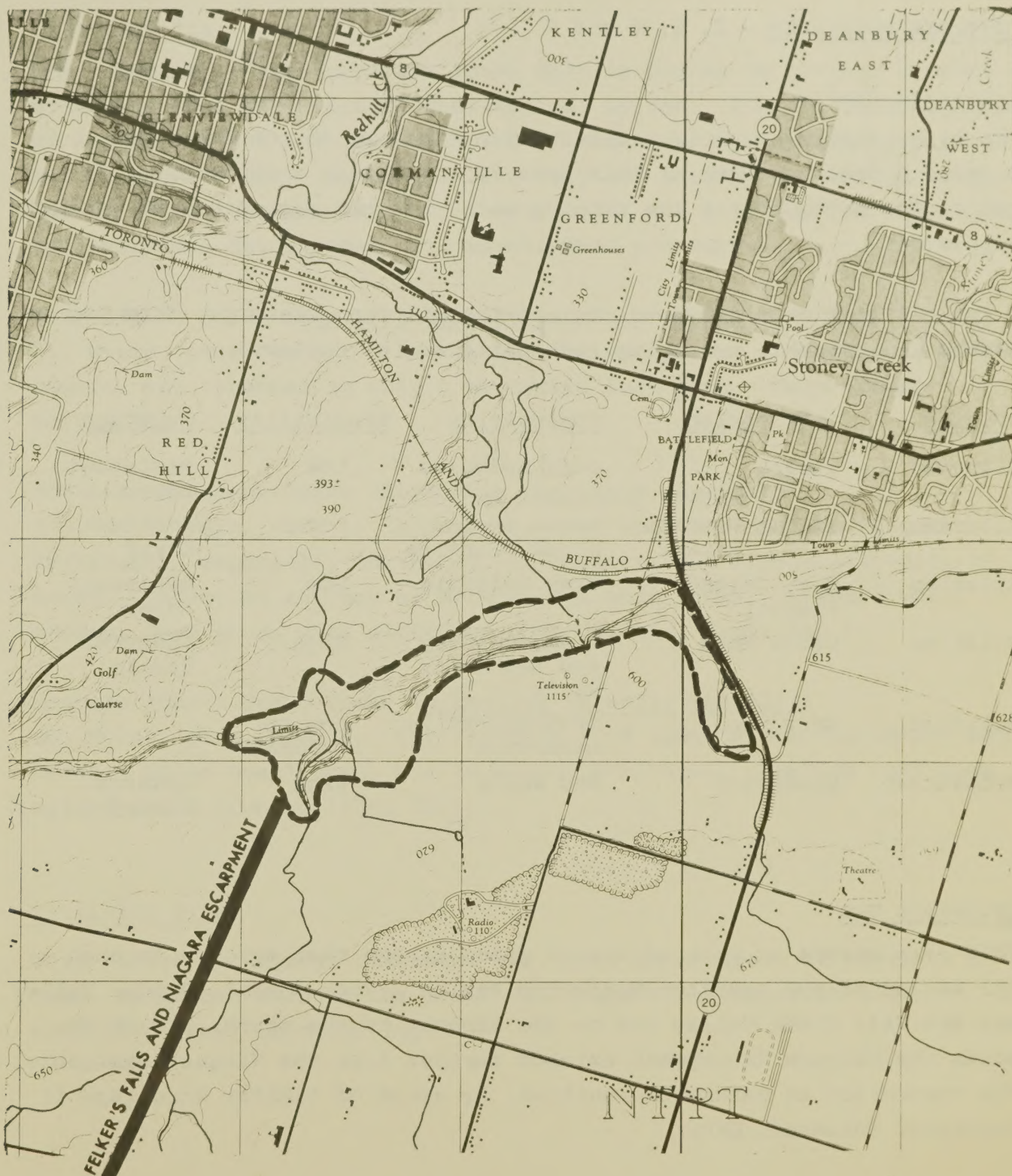
LOCATION

Niagara Escarpment between the City of Hamilton and the Town of Stoney Creek, west of Highway 20.

GENERAL DESCRIPTION

This section of the Niagara Escarpment extends from Felker's Falls to the road cut for Highway 20. Felker's Falls is the main drainage path over the escarpment, in this area, for the stream water arising on the slopes of the Niagara Falls moraine. The erosive force of the water has cut a good set of geologic exposures, into the escarpment rock, at Felker's Falls.

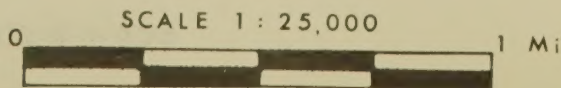
Most of the area is heavily wooded, but land clearing has removed most of the trees on the land above and below the escarpment face. An upland deciduous forest occurs on the uplands around Felker's Falls itself.



26

Topographic Map Reference - MOUNT ALBION 30M/4f Edition 2

Military Grid Reference - 990845



ecologistics limited

1976

CRITERIA FULFILLED - 1, 2, 6 and 9

Criterion One

The Niagara Escarpment is a distinctive landform in the Hamilton-Wentworth Region. Most of this area is relatively undisturbed. In the Felker's Falls area the running water has cut a good set of geologic exposures.

A typical rock outcrop shows most of the Silurian history. From top to bottom the commonly occurring rock units are as follows:

<u>Period</u>	<u>Formation</u>	<u>Composition</u>	<u>Erodibility</u>	<u>Function</u>
Silurian	Guelph	Buff Dolomite	Low	Resistant Layer
Silurian	Guelph-Eramosa Member	Black Shale Black Dolomite	Low	Resistant Layer
Silurian	Goat Island Gasport	Grey Dolomite	Low	Resistant Layer
Silurian	Cabot Head	Greenish Grey and Red Silty Shale	High	Undercut Easily
Silurian	Whirlpool	Orthoquartzitic Sandstone	Low to Moderate	
Ordovician	Queenston	Red Shale	High	Undercut Easily

Criterion Two

This area serves as part of a thin green ribbon that extends through the center of the Hamilton-Wentworth Region. Rock Chapel, Dundas Valley and Red Hill Creek Valley are on the ribbon, to the north, and to the south the Niagara Escarpment extends further into the Niagara Peninsula. The connection of nature communities, by areas of similar structure is important (Diamond, 1975).

Criterion Six

Many species of creatures are found only in pieces of natural biological community that have escaped destruction, by man. The following species of snakes are all harmless, innocuous, and have quite attractive colors and color patterns. Never-the-less they are usually removed as a consequence of habitat removal. This section of the landscape is very steep and therefore has escaped some development pressures.

Red-bellied Snake (Storeria occipitomaculata occipitomaculata)
(G. Myers, pers. comm.). A small secretive species and probably quite common, but recorded at only 3 Wentworth locations. More common northward.

Northern Ringneck Snake (Diadophis punctatus edwardsi)
(G. Myers, pers. comm.). Apparently most common along the Niagara Escarpment, especially northward, in Ontario, but irregularly-distributed. Secretive and may be more common than known. Favours well-wooded, damp areas with plenty of cover (rocks, logs, etc.).

Eastern Smooth Green Snake (Opheodrys vernalis vernalis)
(G. Myers, pers. comm.). Difficult to find among green vegetation and perhaps often overlooked, but locally-distributed. Prefers semi-open upland areas (Conant 1975, 185).

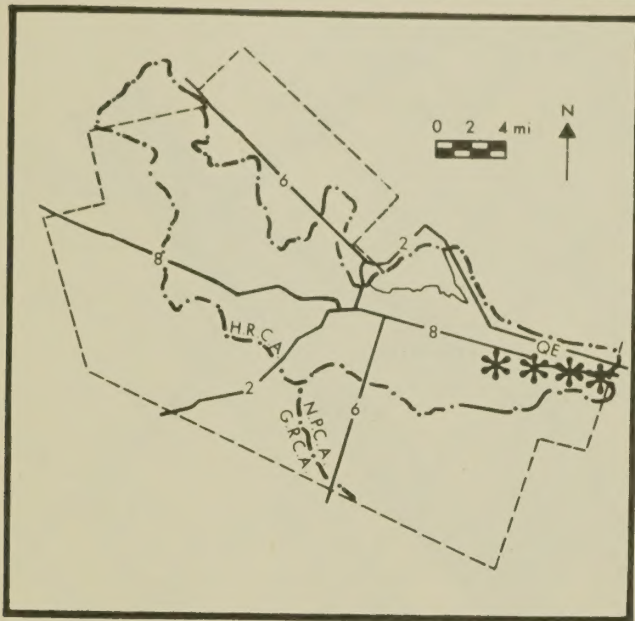
Criterion Nine

This wooded Escarpment dominates the local landscape. It provides a green space backdrop to the urban development to the north and provides expansive views from its lip.

**NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS**

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION		
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

The very steep slope of the escarpment prevents some activities from occurring in any large extent (i.e. active recreation). Nevertheless the biological communities on these slopes could be easily damaged by over use and the consequent vegetation destabilization could result in rapid erosion.



NAME

Niagara Escarpment -
Devil's Punch Bowl East
CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

A

OWNERSHIP

Private

SIZE

950 acres

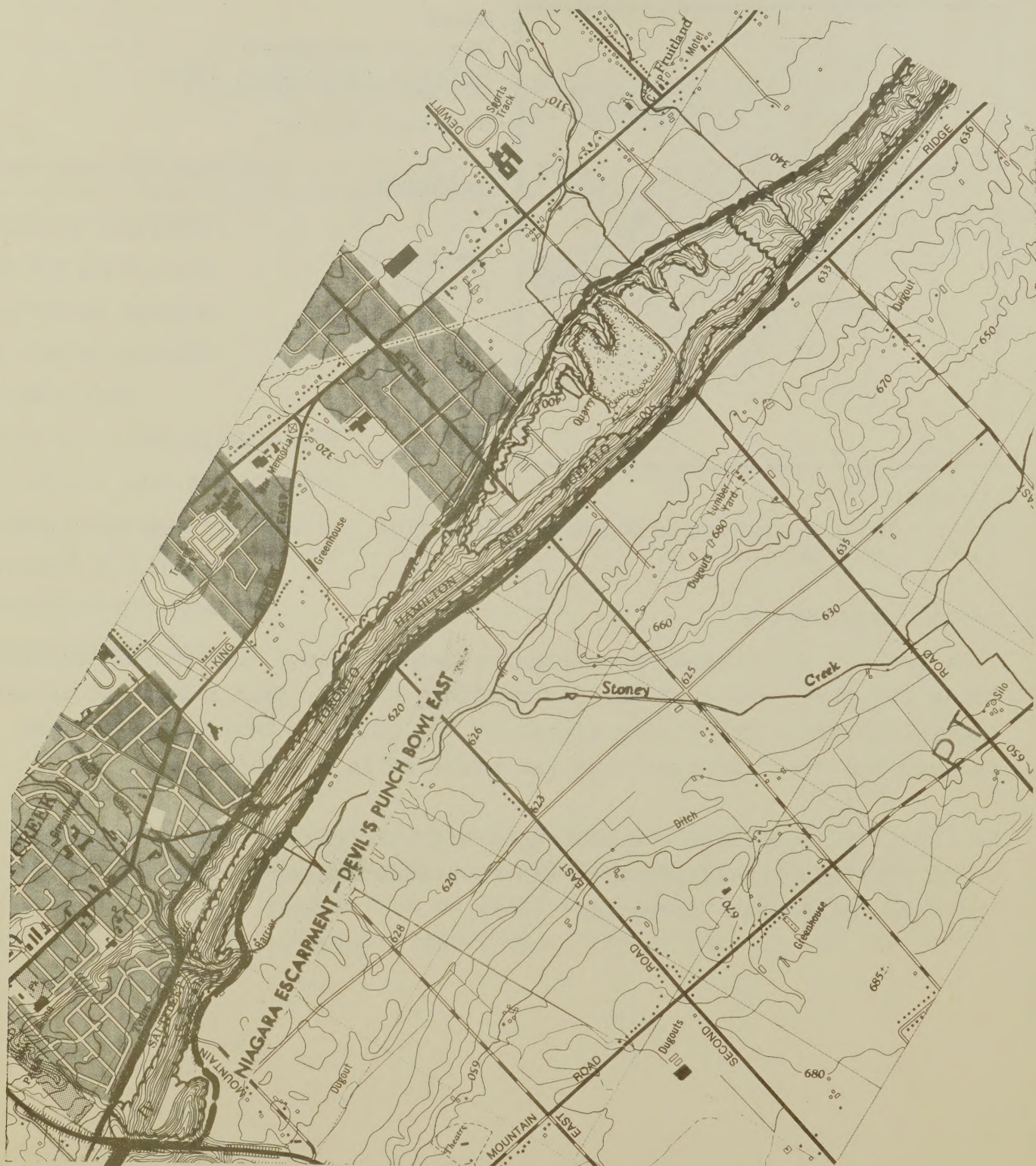
LOCATION

The Escarpment running through the center of the Town of Stoney Creek, east of Highway 20.

GENERAL DESCRIPTION

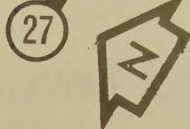
This part of the Niagara Escarpment extends through the Town of Stoney Creek for more than 6 miles. It contains a long, thin ribbon of forest growing on the north-facing slopes of the cliffs. Several roads pass through the area and quarrying has occurred in a few places.

The Devil's Punch Bowl contains good geologic exposures and shows a major geologic transition from the Powerglen sandstone and shales to the Cabot Head shale formation.



Topographic Map Reference - WINONA 30M/4g Edition 2
MOUNT ALBION 30M/4f Edition 3

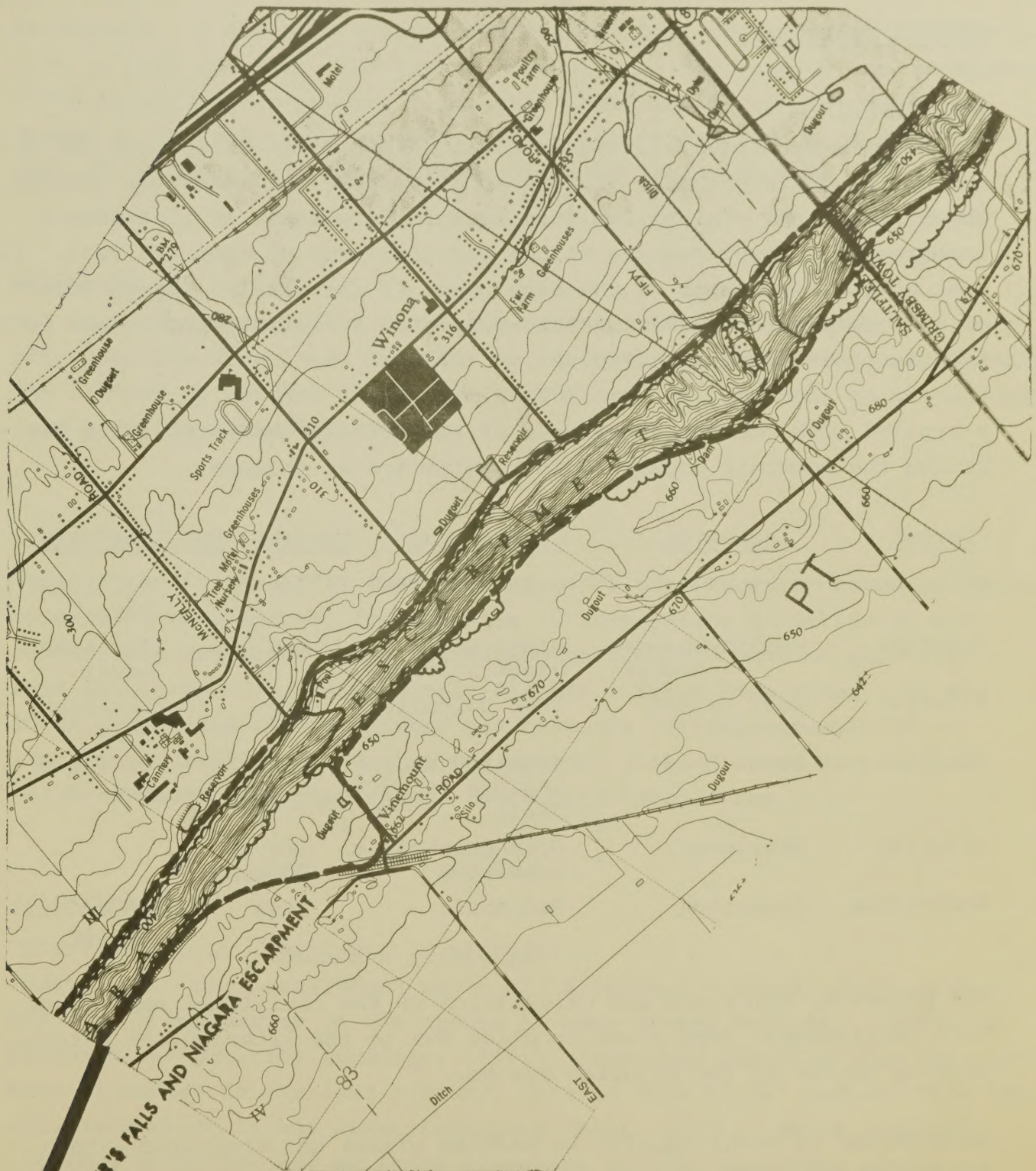
Military Grid Reference - 060841



SCALE 1 : 25,000
0 1 Mi

ecologistics limited

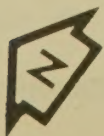
1976



FELKER'S FALLS AND NIAGARA ESCARPMENT

Topographic Map Reference - WINONA 30M/4g Edition 2
MOUNT ALBION 30M/4f Edition 3

Military Grid Reference - 060841



SCALE 1 : 25,000
0 1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 1, 2, 3, 6 and 9

Criterion One

The Niagara Escarpment is a geological landform extending over 380 miles through southern Ontario. It tends to dominate the landscape through which it passes. In the Hamilton area it is present as a prominent topographic bedrock feature with a vertical drop of over 200 feet. The most common expression of the escarpment is the mantled scarp, formed as a consequence of differential erosion of resistant caprock and softer underlying rocks (Hewitt, 1971).

A typical rock outcrop shows most of the Silurian history. From top to bottom the commonly occurring rock units are as follows:

<u>Period</u>	<u>Formation</u>	<u>Composition</u>	<u>Erodibility</u>	<u>Function</u>
Silurian	Guelph	Buff Dolomite	Low	Resistant Layer
Silurian	Guelph-Eramosa Member	Black Shale Black Dolomite	Low	Resistant Layer
Silurian	Goat Island Gasport	Grey Dolomite	Low	Resistant Layer
Silurian	Cabot Head	Greenish Grey and Red Silty Shale	High	Undercut Easily
Silurian	Whirlpool	Orthoquartzitic Sandstone	Low to Moderate	
Ordovician	Queenston	Red Shale	High	Undercut Easily

The presence, thickness and orientation of the individual rock units vary considerably from place to place due to the lithological heterogeneous nature of the Silurian System.

Groundwater is found chiefly in bedding planes and fractures within the dolomite. Recharge may originate from infiltration through local sand and local bedrock outcrops near the escarpment brow or it may originate from regional infiltration further to the south. In any case, its destination is in the form of other seepage from the face of the

escarpment. A drainage system then carries most of the water as surface flow to Lake Ontario. The broken rock pile at the base of the escarpment could be serving to produce a possible infiltration condition for re-charge to the red shale aquifer. Quantitative evaluation of such a process is impossible to make without detailed field studies.

Criterion Two

The escarpment provides a vital ecological function by linking the largest sensitive areas near Hamilton to the natural communities near Grimsby. The linkage of natural biological communities is important to their long term survival (Diamond, 1975).

Criterion Three

The forests in the Fifty Road area are high quality environments. These relatively-undisturbed, forests have an interesting gradation of tree communities developed along the escarpment slope. West of the Fifty Road can be found a predominately Red Oak - White Pine ridge. On the lower slopes the unusual ridges and contours contain a number of important communities. One of the unusual plants is the rare Yellow False Foxglove (Gerardia flava) (MacDonald, pers. comm.).

Criterion Six

Upland Sandpiper (Bartramia longicauda)

(Saltfleet - near escarpment north of Tapleytown - Curry, pers. comm.). Nests in a depression on the ground in open grassy uplands: hayfields, pastures and prairies (Godfrey, 1966). Excessive shooting, for the commercial market in the last century, reduced this birds' numbers to a low ebb, from which it has never recovered (Bent, 1928). Three Regional stations known but may be found elsewhere in old, abandoned fields.

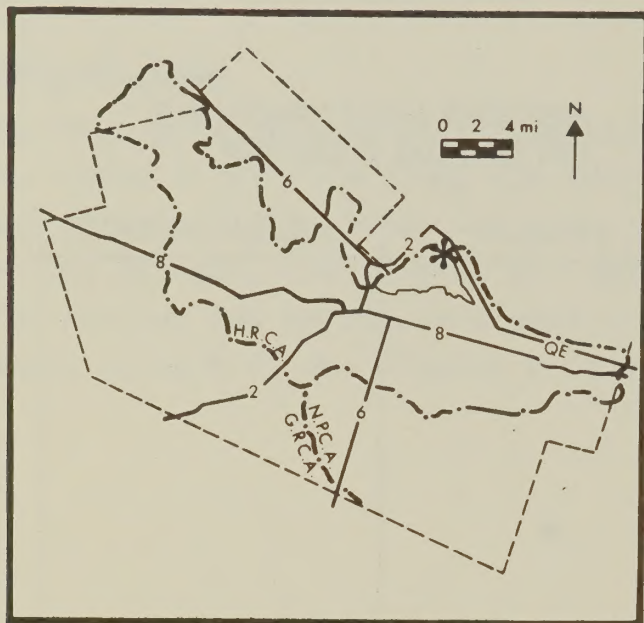
Criteria Nine

The high aesthetic value of the Niagara Escarpment is well recognized. The Bruce Trail runs along the rim of the cliffs and provides very enjoyable passive recreation that is based upon the user's appreciation of the scenery, countryside and natural communities. Much of the eastern section has an improved road, running along the escarpment edge, which is part of the Niagara Peninsula Scenic Drive.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION		
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

The steep slopes of the Escarpment limit most forms of development and many forms of active use of the area. Never-the-less the vegetated slopes are sensitive to destruction by over-use and if the vegetation is removed erosion could increase.



NAME

Hydro Islands

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Public (Ontario Hydro)

SIZE

LOCATION

In the northeast corner of Burlington Bay.

GENERAL DESCRIPTION

The hydro islands were constructed to provide foundations for large hydro transmission towers. They are located across the harbour from one of the most heavily industrialized areas of Canada. On these artificial, stone islands, at the base of the towers, dozens of common terns have nested.

Michael Gilbertson (1975) studied these colonies for the Canadian Wildlife Service and he wrote:

"As I walked about one of these islands, many birds whirled around my head and swooped down upon me again and again to prevent me from approaching their nests. Their shrill piercing cries rang in my ears. As I wandered about, I soon noticed that something was fundamentally wrong with the colony. While some young of varying age were found in the nests, the eggs in most had failed to hatch. On examining one of these eggs, I found that the young chick had died before it could completely crack open the shell. Several other eggs contained dead embryos. At the edge of a grass tussock, I also noticed an abnormal

two-week old chick, its upper and lower bill crossing over without meeting - a deformity which would result in certain starvation."

Various toxic substances were isolated from the eggs including: DDT, dieldrin, hexachlorobenzene (HCB), polychlorobiphenyls (PCBs) and heptachlor. These substances are suspected as being the causative agents for the reproductive problems (Gilbertson, 1975).

These colonies were abandoned in 1975 (North, pers. comm.), probably due to high water levels (Curry, pers. comm.). With recent gradual dropping lake levels the terns will probably return to nest on the hydro islands (Curry, pers. comm.).

CRITERION FULFILLED - 6

Criterion Six

Common Tern (Sterna hirundo)

(Hydro Islands - found there in 1961, 66, 68, 71, 72 and 73 - ONRS, Gilbertson, 1975). The colonial nests are usually placed on the open edges of sandy and gravelly beaches or flat areas on islands (Godfrey, 1966). This ground nester requires areas that are safe from mammalian predators, such as raccoons, and therefore the small hydro islands have been chosen for nesting. Only two nesting areas in the Region.



28

Topographic Map Reference - BURLINGTON 30M/5c Edition 3

Military Grid Reference - 966958



SCALE 1 : 25,000 1 Mi

ecologistics limited

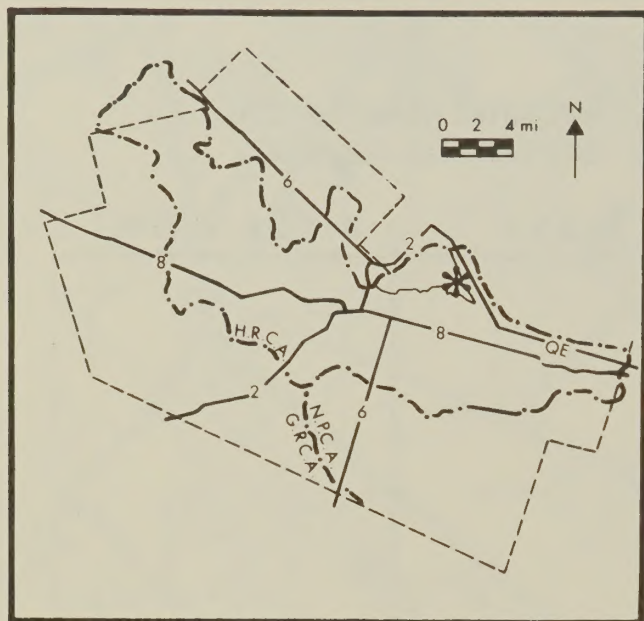
1976

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE		
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	●	
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES		
RESOURCE EXTRACTION		

The islands are sensitive to disturbance in the breeding season of the terns which extends from April through July. During the rest of the year the birds migrate elsewhere.

The high levels of toxic substances in the terns may serve as an early warning of problems, for other inhabitats of the area.



NAME

Toll Gate Ponds

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Public

SIZE

70 acres

LOCATION

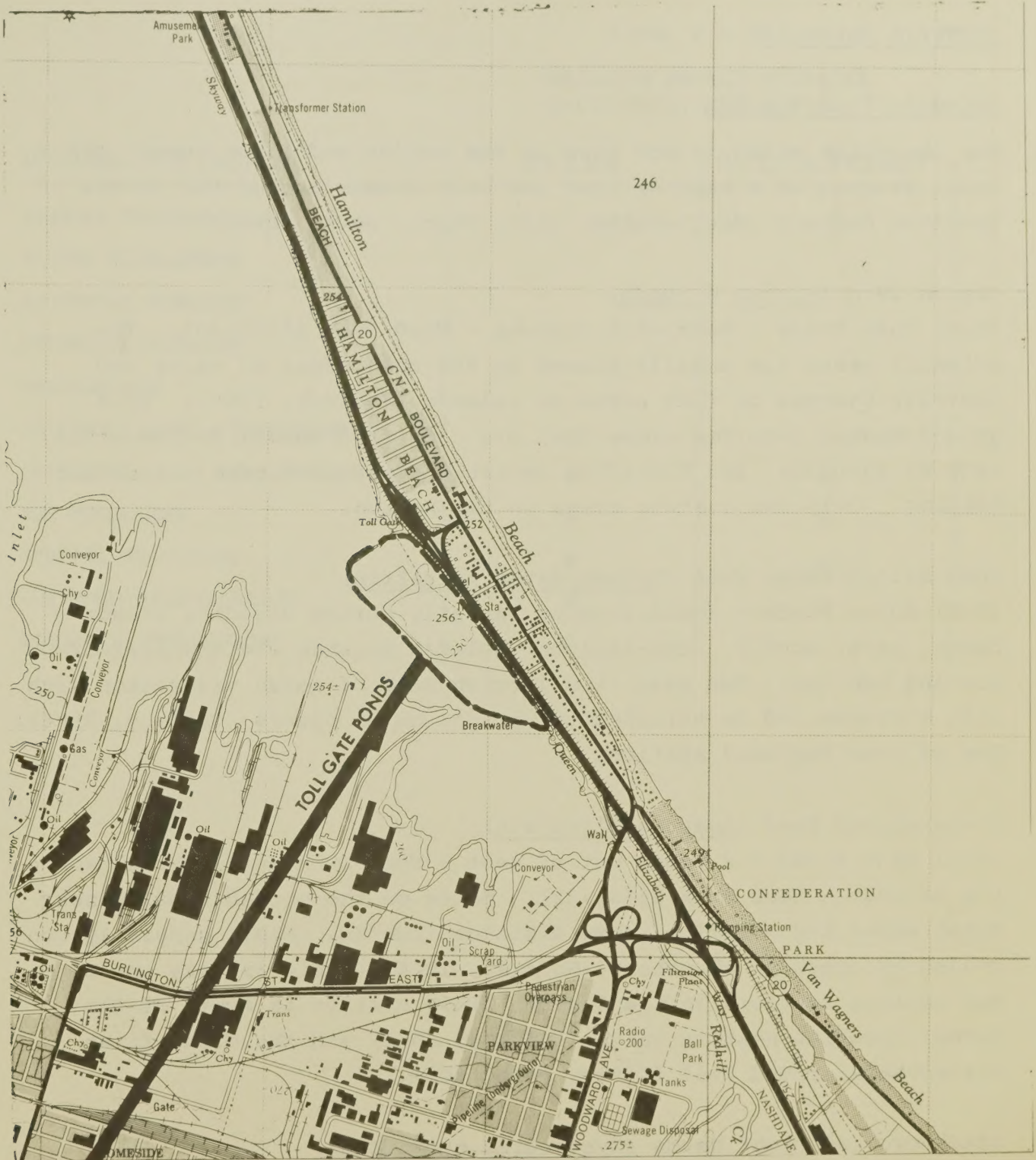
In the northeast corner of Hamilton Harbour, near the Hamilton Beach.

GENERAL DESCRIPTION

This area has been an active land fill site for some time but areas of marsh and swamp are still found. In these natural areas are found several species of birds that nest in or near bodies of water.

These nests and the surrounding landfill illustrates the destruction of shoreline marshes that have taken place in the Region, in the past. These creatures still survive here in low numbers but are in danger of elimination due to landfill and subsequent development.

The area has been highly disturbed but has been given a B status because of the presence of the uncommon marsh nesting birds.



29

Topographic Map Reference - BURLINGTON 30M/5c Edition 3

Military Grid Reference - 987915



0 SCALE 1 : 25,000 1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 4 and 6

Criteria Four and Six

The shoreline marsh is now rare in the Region and these scraps are a small remnant of a habitat that was once common around the shores of Hamilton Harbour (MacIlwraith, 1886; North, pers. comm.).

Common Tern (Sterna hirundo)

(Toll Gate Ponds - Nest with 1 young - Wood Duck 25(3):36). The colonial nests are usually placed on the open edges of sandy and gravelly beaches or flat areas on islands (Godfrey, 1966). This ground nester requires areas that are safe from mammalian predators, such as raccoons, and therefore isolated areas have been chosen for nesting. Only two nesting areas in the Region.

Long-billed Marsh Wren (Telmatodytes palustris)

(Toll Gates Ponds - found singing recently during breeding season - Curry, pers. comm.). Cat-tail and bulrush marshes are the preferred nesting habitat. The nest is a largish ball of marsh vegetation with side entrance and is attached to upright marsh plants (Godfrey, 1966). One of four Regional stations.

Green-winged Teal (Anas carolinensis)

(Toll Gate Ponds - 2 young out of nest - Wood Duck 24(3):29, 11 young out of nest - Wood Duck 25(3):32). Nests on the ground usually near fresh water but sometimes some distance from it. Nests generally concealed by grass or shrubbery (Godfrey, 1966). This is only one of two nesting stations in the Region. This station is south of the normal Canadian nesting range (Godfrey, 1966) and the birds first nested here around 1965 (Curry, pers. comm.).

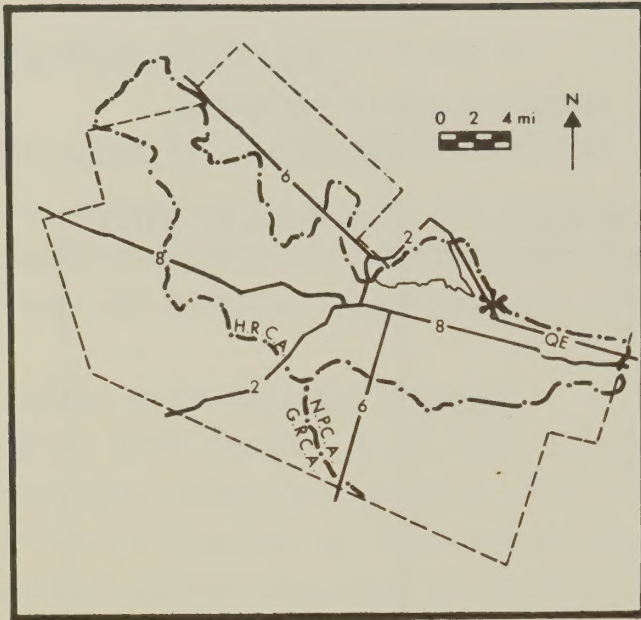
Black-crowned Night Heron (Nycticorax nycticorax)

(Toll Gate Ponds - 8 nests in 1975 - Wormington, pers. comm., May 17, 1975 - 6 nests found - Wood Duck 29(2):31). Nests in colonies. Nest of sticks found in trees, occasionally in bushes, rarely on the ground (Godfrey, 1966). Nests usually found near feeding areas in marshes and sloughs. Only remaining Regional breeding station.

ecologistics limited

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE		
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	
RESOURCE EXTRACTION	•	



NAME

Redhill Creek Marsh -
Van Wagner's Marsh
CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

A

OWNERSHIP

Private and Public

SIZE

72 acres

LOCATION

At the mouth of Redhill Creek in the northeastern area of Hamilton.

GENERAL DESCRIPTION

The mouth of Redhill Creek has a system of high quality marshes that are representative of a habitat that was once common in the harbour area (McIlwraith, 1886). Urbanization now surrounds the area and has had its effects. Highways 20, Q.E.W., Burlington Street and Woodward Avenue and a CN Railway line now pass through the area and have reduced the size of the marsh accordingly. The dominant vegetation is cat-tail (*Typha latifolia*). The water quality of the river near the mouth is poor (MOE) because of the presence of pollutants from a variety of upstream sources. The marsh likely acts as a living filter or buffer for sediments and nutrients coming in from upstream sources. In this way it helps to improve the water quality (Dorney, 1973).

Least Bittern (Ixobrychus exilis)

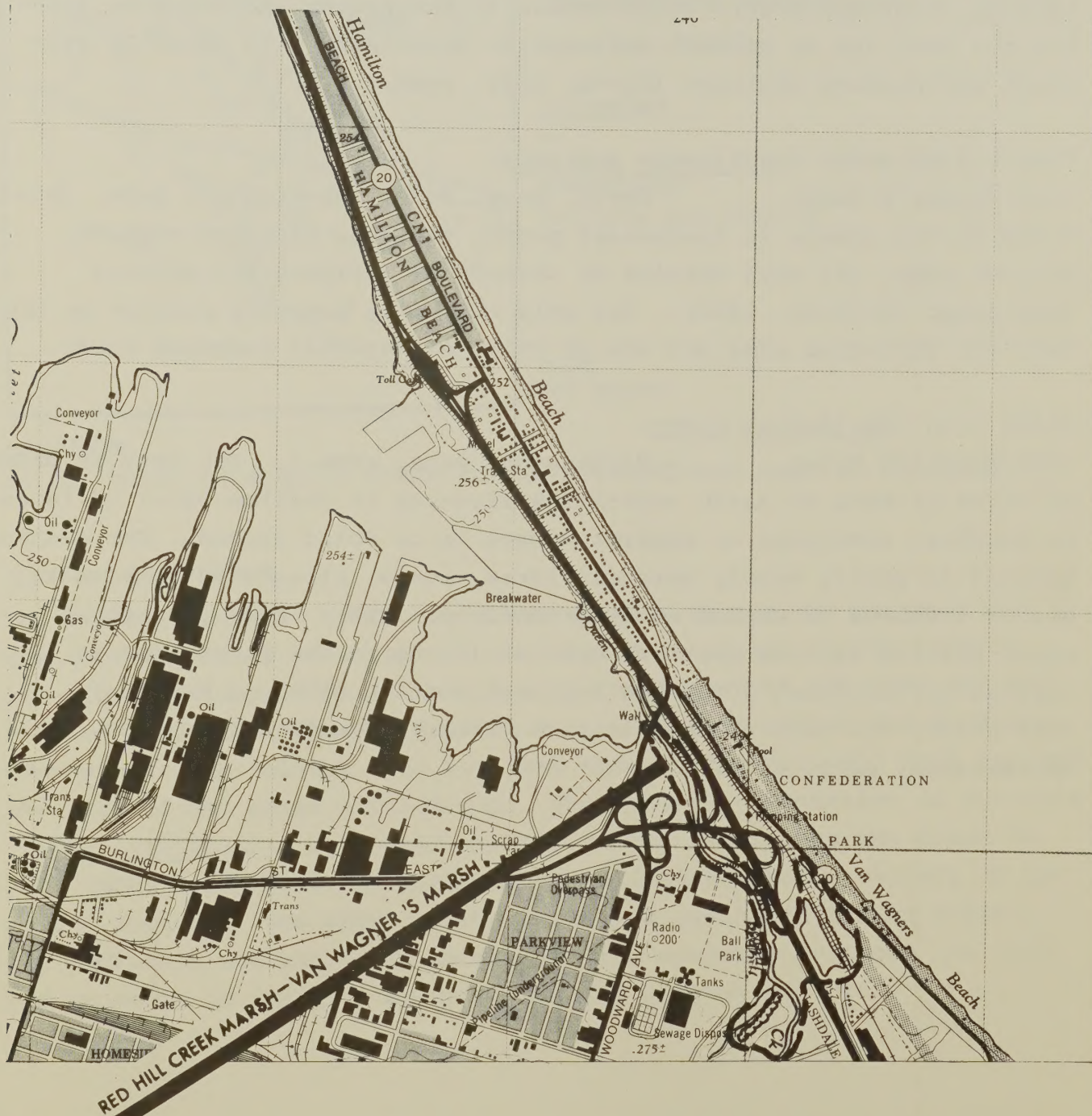
(Van Wagner's Marsh - Wormington, pers. comm.). Nests in freshwater marshes (Godfrey, 1966). Once common in the Region (McIlwraith, 1886) but now rare due to habitat destruction associated with landfill projects and wetland drainage (North, pers. comm.).

Pied-billed Grebe (Podilymbus podiceps)

(Van Wagner's Marsh - North, pers. comm., Wormington, pers. comm.). Found in the summer in freshwater ponds, sloughs, sluggish streams, shallow bays, all with margins or islands of emergent and aquatic vegetation (Godfrey, 1966). The only remaining breeding station on the Hamilton shoreline area and one of only two Regional breeding areas.

Black Tern (Chlidonias niger)

(Van Wagner's Marsh - Wormington, pers. comm.). The nest is placed on rafts or mats of marsh vegetation floating in shallow water of lakes or marshes, sometimes on muskrat houses or on solid ground. The nesting habitat is mainly watery marshes, lakes, ponds, sloughs and rivers in either treeless or wooded country (Godfrey, 1966). This is another marsh nesting species that has been declining in the Region due to habitat destruction. Only two Regional nesting stations known and this colony has been reduced in size recently due to development (Wormington, pers. comm.).



30

Topographic Map Reference - BURLINGTON 30M/5c Edition 3

Military Grid Reference - 001897



0 SCALE 1 : 25,000 1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 4 and 6

Criterion Four

This cat-tail marsh is a small remnant of a once common community in the Hamilton Harbour area. Cat-tail marshes develop in sheltered bays and inlets along the Great Lakes shoreline. In this Region the beach strip sand bar provides protection from the lake waves and allowed marshes to develop around Burlington Bay. With industrialization and urbanization developing behind an excellent harbour the marshes were filled in and destroyed. Today the Redhill Creek and Cootes' Paradise Marshes are the only big ones left.

Criterion Six

It has been reported that Painted Turtle (Chrysemys picta marginata), Snapping Turtle (Chelydra serpentina serpentina), Musk Turtle (Sternotherus odoratus), Eastern Spiny Softshell (Trionyx spiniferus spiniferus), Map Turtle (Graptemys geographica) and Blanding's Turtle (Emydoidea blandingi) possibly still occur here (Wormington, pers. comm.). Eastern Spiny, Map and Blanding's are regionally rare.

Red Bat (Lasiurus borealis borealis)

(Van Wagner's Marsh, ROM #32654). The specimen of this migratory tree bat, more common southward than northward in the province, was taken from a flock of "80-100 migrating along beach" (ROM data). Possibly the beach is an important congregation site for Red Bats during migration.

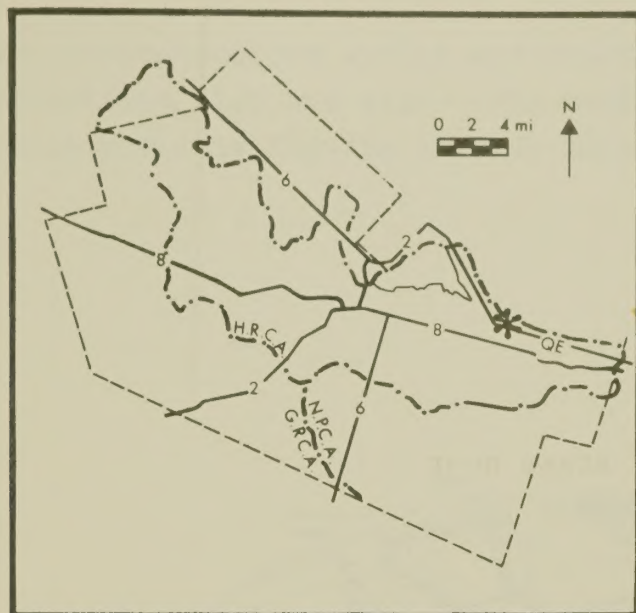
Common Gallinule (Gallinula chloropus)

(Van Wagner's Marsh - North, pers. comm.). This somewhat colonial nester can be found in freshwater marshes of various sizes, usually where there is at least a small area of open water (Godfrey, 1966). North (pers. comm.) has counted up to several hundred of these birds, in breeding season, in the marshes of East Hamilton in the 1930's. Most of these marshes have since been destroyed by industrial, urban and transportation development. Van Wagner's Marsh is a valuable piece of these once extensive marshes. Only two remaining breeding stations are known.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION	•	
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT	•	
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•

The marsh has already been heavily affected by: upstream pollution, transportation development and local industrial development. Nevertheless much remains that is valuable. Careful management would allow the marsh to invade open water areas near the river's mouth, which would give the rare species more habitat to survive in and make their position less precarious.



NAME

Stoney Creek Ponds

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Private and Public
(City of Hamilton)

SIZE

90 acres

LOCATION

Along the Lake Ontario shore in the City of Hamilton and the Town of Stoney Creek.

GENERAL DESCRIPTION

The Stoney Creek Ponds are elongated water bodies in the lower reaches of streams most of which originate below the escarpment. They appear to have been formed by the formation of spits, across the creek mouths, caused by longshore drift. From the configuration of the deposited material in between the groynes of this part of the coast, the longshore drift that builds the spits appears to be from east to west. In-filling of the lakes, by sediment brought down by the creek, appears to be taking place. Most of the ponds are connected to Lake Ontario by narrow channels cut through the spits.

The ponds and the associated marshes are small but important as refuges for the creatures that inhabit these uncommon habitats. Recent development has eliminated some of the marsh habitat in the ponds but some still remains.

The Stoney Creek has poor water quality with frequent low dissolved oxygen levels and occasional high summer temperatures. (Hamilton Federation of Environmental Groups, 1972). Many of the source creeks dry up in the summer.



31

Topographic Map Reference - WINONA 30M/4g Edition 2
MOUNT ALBION 30M/4f Edition 3

Military Grid Reference - 020883



SCALE 1 : 25,000
0 1 Mi

ecologistics limited

1976

Groundwater occurs within red shale that is confined by overlying glacio-lacustrine clay and silt. The hydraulic gradients suggest that the groundwater is flowing towards Lake Ontario.

CRITERIA FULFILLED - 4 and 6

Criteria Four and Six

Marshes are uncommon in the Region and are subject to destruction due to land filling and severe water pollution.

Stoney Creek Ponds (by Crescent Beach)

Musk Turtle (Sternotherus odoratus)

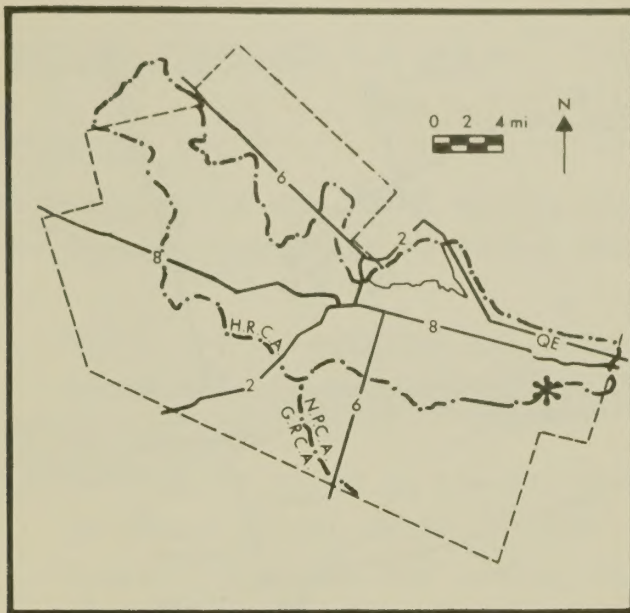
(G. Myers, pers. comm.). A secretive, highly aquatic small turtle, probably more common than its irregular southern Ontario distribution indicates; one of 3 recorded Wentworth locations.

Blanding's Turtle (Emydoidea blandingi)

(Martin 1950). Irregularly distributed through southern Ontario, especially in extensive marsh/swamp areas; more common to south and west. One of 3 Wentworth reported occurrences.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION	●	
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT	●	
INTENSIVE LAND DEVELOPMENT	●	●
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●



NAME

Saltfleet Woodlot

CONSERVATION AUTHORITY

Hamilton Region
Niagara Peninsula

CATEGORY

B

OWNERSHIP

Private and Public

SIZE

336 acres

LOCATION

In the Town of Stoney Creek, southwest of Vinemount.

GENERAL DESCRIPTION

This large woodlot sits on a flat clay plain. Drainage ditches drain the surface water west to the Stoney Creek and east to the Forty-Mile Creek.

The surficial deposits of the area are then lacustrine silt and clay over till. Developed on this are poorly drained Lincoln silty clay loam soils.

The woodlot is the largest piece of native forest in the Region, south of the Niagara escarpment. It now contains a dump but the detailed effects of this development are unknown.

There is little published information available on this large woods. It should be field-checked by competent resource personnel in order to ascertain its true status.



32

Topographic Map Reference - WINONA 30M/4g Edition 2

Military Grid Reference - 060825



SCALE 1 : 25,000

1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 2 and 6

Criterion Two

No water wells are found within the sensitive area boundary. Wells in the vicinity show the following characteristics:

1. Water yield is variable. Most wells have specific capacities exceeding 1.0, therefore overall the aquifer is good.
2. Bedrock is close to the surface in some locations and forms outcrops. In other places up to 35 feet of glaciolacustrine clay and silt is found. Although the actual depth of overburden in the study area is unknown, it is suspected to be quite shallow.
3. Shale yields the water as well as dolomite.
4. Water is found at variable depth into bedrock. In some wells the water table lies 2 feet below the bedrock surface and in others it is found as deep as 63 feet. This uneven horizontal distribution may indicate that areas of high infiltration are scattered.

The overall movement of groundwater, including the nearby area, is from the southwest to northeast. In the west the movement swings in the direction of Stoney Creek.

If the overburden, within the sensitive area, is 15 feet thick or less then the area fulfills a recharge function.

Criterion Six

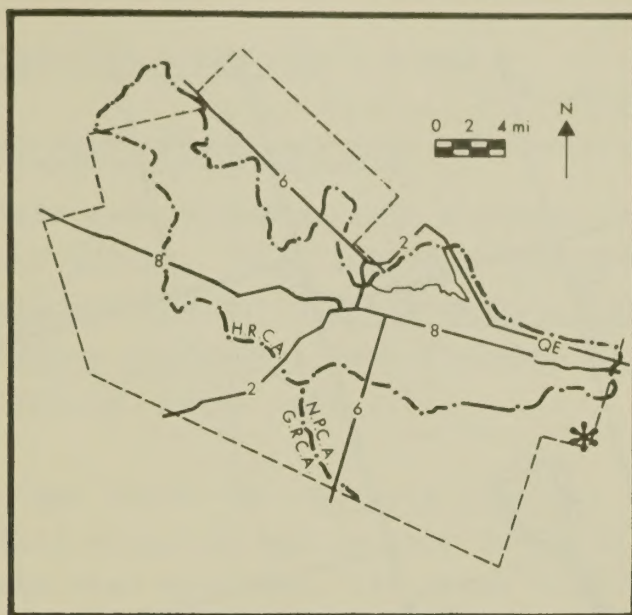
Marsh Hawk (Circus cyaneus)

(Saltfleet Forests - nest in the fields near the woodlot - Copeland, pers. comm.). The nest is placed on the ground among low bushes or other low vegetation usually in a moist meadow or marshy place (Godfrey, 1966). This species has declined significantly, as a nesting species, in this Region in the last 40 years (North, pers. comm.).

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	•	
AIR POLLUTION	•	
STREAM POLLUTION	•	
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•

Field inventories are needed in order to provide the information needed to ascertain the detailed environmental conditions present, in this large woodlot.



NAME

Tweedside Forest

CONSERVATION AUTHORITY

Niagara Peninsula

CATEGORY

B

OWNERSHIP

Private

SIZE

18 acres

LOCATION

In the eastern end of the Hamilton-Wentworth Region, southeast of Tweedside.

GENERAL DESCRIPTION

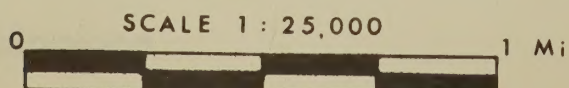
The woodlot is found on the level land of this area. The surficial deposits are thin lacustrine over till, on which has developed the imperfectly drained Binbrook silt loam soils.

It is a wet, swampwoods with many species of trees and shrubs that are Carolinian in nature and therefore somewhat uncommon.

Groundwater is found in the bedrock at depths less than 10 feet. The water is fresh and plentiful. The aquifer, composed of Guelph dolomite, is confined by 20 to 30 feet of overlying blue clay.



Military Grid Reference - 090788



1976

CRITERIA FULFILLED - 3 and 6

Criteria Three and Six

This wet woods contains a number of uncommon southern species of trees and shrubs. They include: Buttonbush (Cephalanthus occidentalis), Winterberry Holly (Ilex verticillata), Native Flowering Crab Apple (Pyrus coronaria), and Highbush Blueberry (Vaccinium corymbosum), (Meyers, pers. comm.).

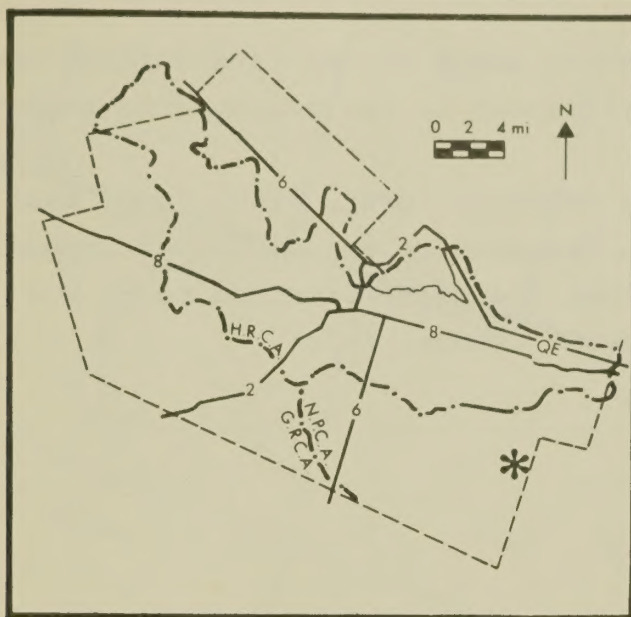
Swamp White Oak (Quercus bicolor) is found here (Meyers, pers. comm.). This southern oak is only found in Canada in extreme southern Ontario and near Montreal. It makes its best growth on moist bottomlands and the margins of swamps (Hosie, 1969). This is one of the very few places in the Region where it grows.

Tupelo (Nyssa sylvatica) is another tree that grows in Canada only in extreme southern Ontario. It makes its best growth on low wet ground along streams or in swamps, but may also be found on well-drained upland soils. It is usually scattered and rather sparsely distributed in some hardwood stands (Hosie, 1969). This is the only known station for this plant in the Region (Meyers, pers. comm.).

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY	•	
INTENSIVE FORESTRY	•	
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT	•	•
INTENSIVE LAND DEVELOPMENT	•	•
AIR POLLUTION	•	•
STREAM POLLUTION		
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•

The small size of this sensitive area makes it particularly susceptible to destruction. Cattle grazing in forests is strongly disapproved by the Ministry of Natural Resources because it prevents natural forest regeneration. Grazing may be a problem here.



NAME

Woodburn Floodplain

CONSERVATION AUTHORITY

Niagara Peninsula

CATEGORY

B

OWNERSHIP

Private

SIZE

68 acres

LOCATION

Immediately east of Woodburn along the Twenty Mile Creek.

GENERAL DESCRIPTION

This area is the floodplain of the Twenty Mile Creek. Lowland Forests line the creek. The surficial deposits adjacent to the creek valley are glaciolacustrine clay and silt. The valley contains alluvial sediments deposited by river action. Alberton silt loam soil clothes the river valley and has variable drainage characteristics. The soils adjacent to the valley are the imperfectly-drained Beverly silt loam developed from the lacustrine deposits. The area is generally one of gentle slopes with individual slopes up to 5%.

The bedrock aquifer in the vicinity of the study area is found at depths of less than 10 feet into the Eramosa shale and dolomite. Specific capacities of most nearby wells exceed 4.0, indicating a very good aquifer. The water is fresh.

The regional ground water flows in a direction parallel to the flow of the Twenty Mile Creek. The hydraulic gradient is low; the bedrock is confined by 15 to 20 feet of blue clay and silt; yet the supply of water is good. Determination of the origins of the infiltration is difficult. Given the widespread uniformity in semi-permeability, the

ecologistics limited

1976

shallow depth of the clay and the gentle slope of the land surface there might be a surprising degree of infiltration in the surrounding region.

A water pollution survey of Binbrook Township (OWRC, 1968) found that the Creek was quite polluted, though temperature and dissolved oxygen were not measured. In summer the flows are often reported to be low or nonexistent (Ham. Fed. of Environment Groups, 1972).



Topographic Map Reference - WINONA 30M/4g Edition 2

Military Grid Reference - 026765



SCALE 1 : 25,000

1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 6

Criterion Six

This is the only known Regional occurrence of Lizard's-Tail (Saururus cernuus) which is emergent here, growing in the middle of the river (McLaren, pers. comm.). This plant ranges from Florida to Texas and north to southern Michigan and southern Ontario (Fernald, 1970). It is very rare and probably occurs at no more than half a dozen stations in southern Ontario.

Other uncommon plants include: Water Dock (Rumex orbiculatus) and Hops (Humulus Lupulus) (McLaren, pers. comm.).

The poor water quality and low summer flows probably resulted in a restricted fish fauna never-the-less one important species occurs.

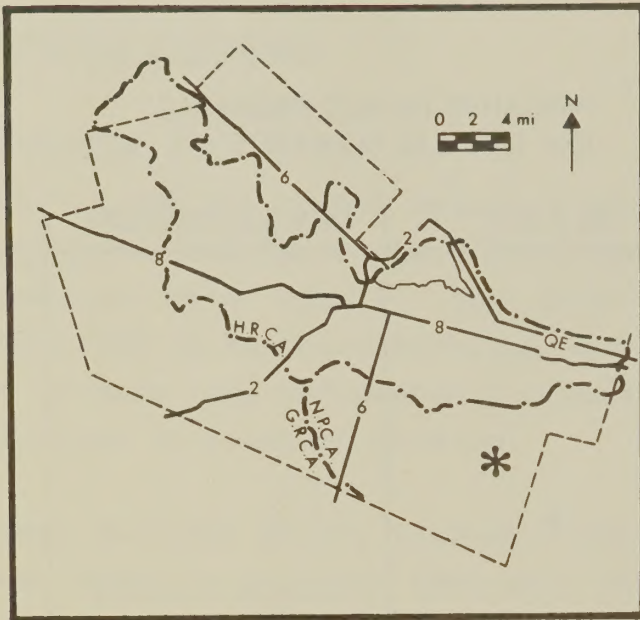
Grass Pickerel (Esox americanus vermiculatus)

(ROM, 1974). This is a new record for the Grass Pickerel (Dr. E. J. Crossman, pers. comm.); it had previously not been found in any Lake Ontario tributaries between the Niagara River and the Bay of Quinte.

The Grass Pickerel resembles a Northern Pike, but is just 6-8" long. It inhabits slow, muddy, weedy streams, or pools within such streams, and occasionally similar shallow bays. It can withstand high temperatures and low oxygen concentrations; and survives particularly well in streams with very low summer flows. Spawning occurs primarily in the spring.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	●	
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●



NAME

Twenty Mile Creek Floodplain Forest
and Meadows

CONSERVATION AUTHORITY

Niagara Peninsula

CATEGORY

C

OWNERSHIP

Private

SIZE

205 acres

LOCATION

Along the Twenty Mile Creek north of Binbrook in Glanbrook Township.

GENERAL DESCRIPTION

This area contains part of the floodplain of the Twenty Mile Creek and adjacent areas. Approximately half of the land is covered by an ash floodplain forest that is relatively undisturbed. A good quality marsh is present. The variety of soil moisture conditions and successional stages of vegetation has allowed a high diversity of plant life to develop (McDonald, pers. comm.).

The surficial deposits of the area adjacent to the river valley is glaciolacustrine clay and silt. The valley bottom contains stream sediments of silt and clay. Alberton silt loam cloths the valley bottom and has variable drainage. The land between the various stream courses contains well-drained Brantford silt loam and imperfectly-drained Beverly silt loam. These two soils have developed from lacustrine silts.

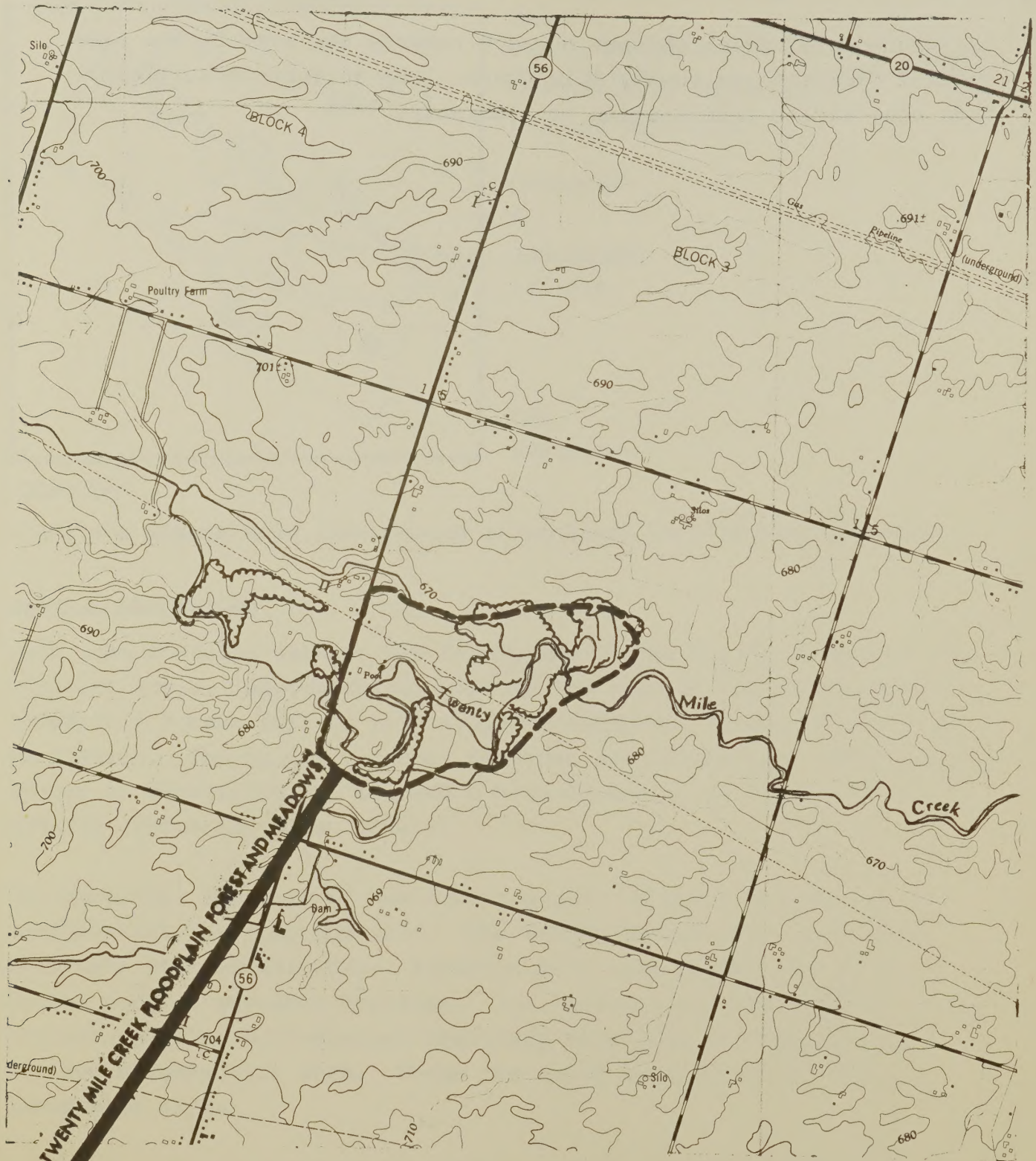
The slopes in the general area are gently sloping with individual slopes being up to 9%.

The groundwater moves through bedrock towards the east in the same general direction as Twenty Mile Creek. The 50 feet of surficial blue clay limits infiltration considerably.

HAMILTON - WENTWORTH REGION
ENVIRONMENTALLY SENSITIVE AREAS STUDY

AREA
NO .

35



35

Topographic Map Reference - MOUNT ALBION 30M/4f Edition 3

Military Grid Reference - 987774



0 SCALE 1 : 25,000 1 Mi

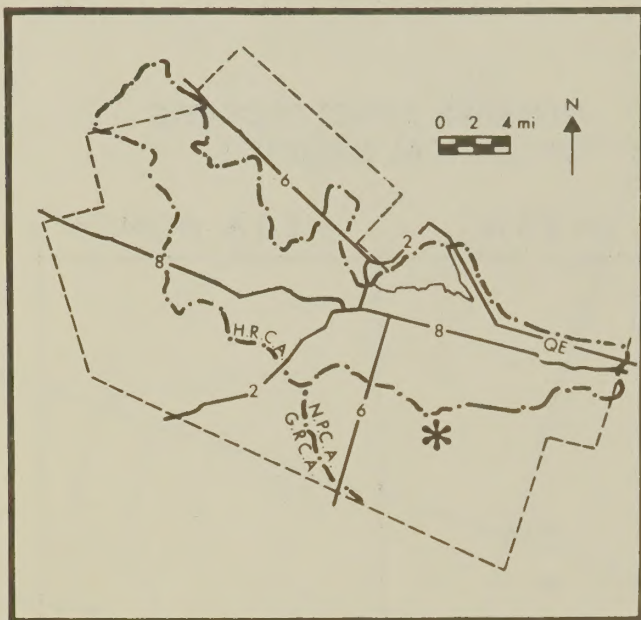
ecologistics limited

1976

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT	•	
INTENSIVE LAND DEVELOPMENT	•	
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•

Detailed floral and faunal surveys are needed in this area.



NAME

Hannon Floodplain Forests

CONSERVATION AUTHORITY

Niagara Peninsula

CATEGORY

C

OWNERSHIP

Private

SIZE

208 acres

LOCATION

Along the Twenty Mile Creek in Glanbrook Township south of Hannon and northwest of Binbrook.

GENERAL DESCRIPTION

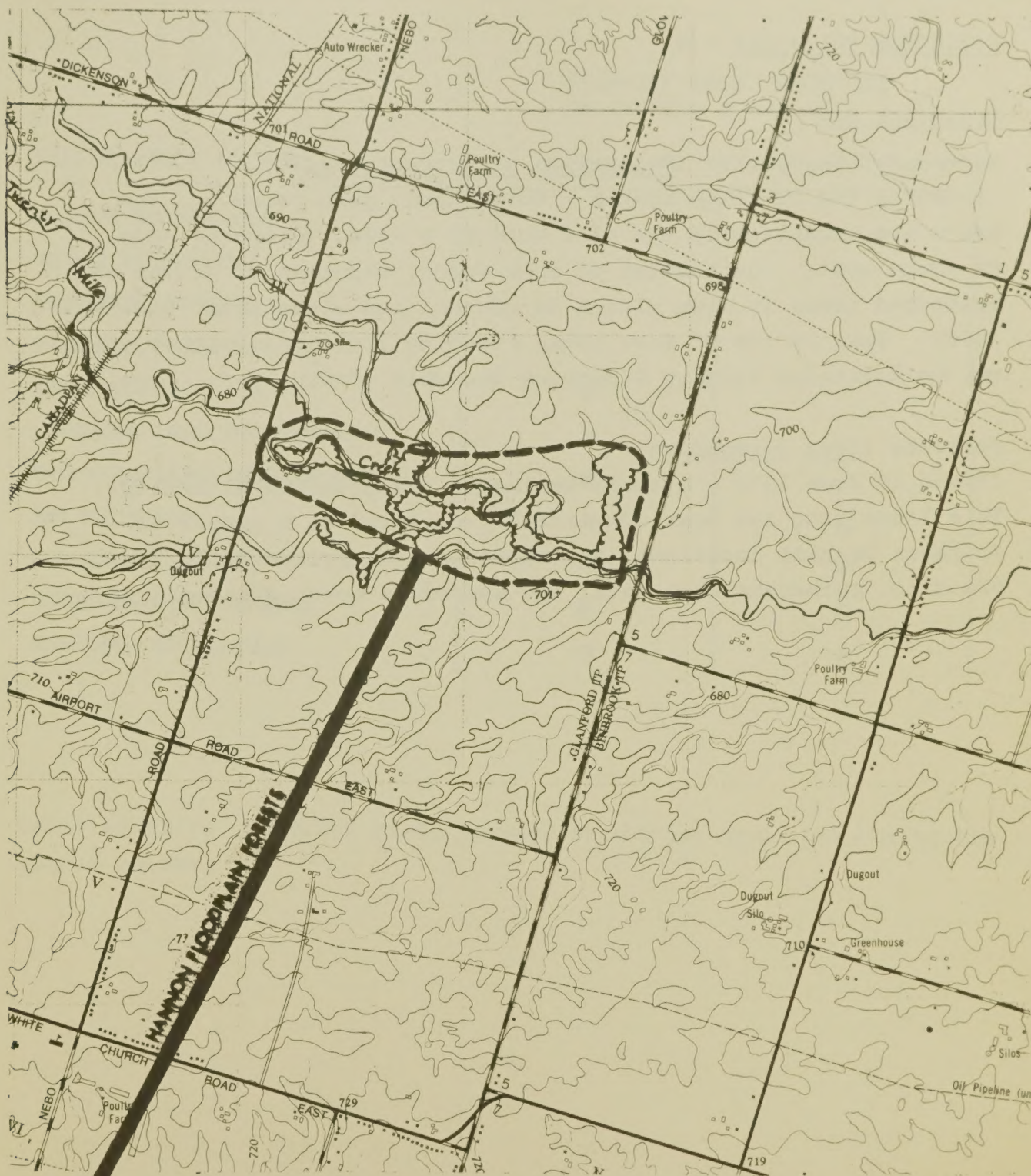
This area lies astride the Twenty Mile Creek and a number of tributaries enter the main stream at this point. Young ash forests line the banks along most of the rivers. The large number of river meanders have enabled a diverse set of wetland habitats to develop (McDonald, pers. comm.).

The surficial deposits are lacustrine silt and clay and the alluvial sediments in the river bottom. The valleys contain Alberton silt loam soils. These are of variable drainage and have developed from the alluvial sediments. The land between the stream courses has well-drained Brantford silt loam. Patches of imperfectly drained Beverly silt loam occur adjacent to the creek bottoms.

Slopes in the range of 2 to 15% occur with the steeper slopes occurring adjacent to the creeks.

The groundwater moves through dolomite bedrock in an easterly direction. There is a fair to good aquifer with sulphur appearing in some wells. The infiltration of water is low due to the 20 to 40 feet of silt and clay on the surface.

ecologistics limited



Topographic Map Reference - MOUNT ALBION 30M/4f Edition 3

Military Grid Reference - 940783

36



SCALE 1 : 25,000

1 Mi

ecologistics limited

1976

CRITERION FULFILLED - 6

Criterion Six

Red-headed Woodpecker (Melanerpes erthrocephalus)

(Found in the breeding season - Wormington, pers. comm.). The nests are excavated in the dead wood of a tree, telephone pole, or fence post. The habitat of open woods, burntlands, groves and scattered trees in open places is general and widespread (Godfrey, 1966). This is one of five known breeding locations. Other pairs may be scattered through Glanbrook Township (Curry, pers. comm.).

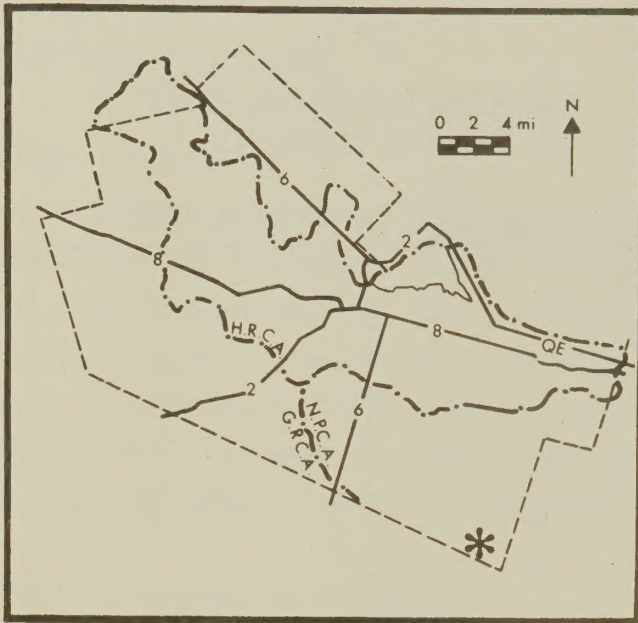
Bullfrog (Rana catesbeiana)

(Found in June 1976 - Niagara Peninsula Conservation Authority). This large frog has been commercially-depleted at a number of southern Ontario locations, and requires some protection. For breeding, permanent deep water and shoreline cover are required.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT	●	
INTENSIVE LAND DEVELOPMENT	●	
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

Detailed flora and fauna field surveys should be conducted during the summer months.



NAME

Sinclairville Lowland Forests

CONSERVATION AUTHORITY

Niagara Peninsula

CATEGORY

B

OWNERSHIP

Private

SIZE

646 acres

LOCATION

Along the Wetland River in the southeastern corner of the Regional Municipality of Hamilton-Wentworth.

GENERAL DESCRIPTION

This extensive system of lowland forests is situated along the Welland River. The forests contain deciduous trees of a variety of species, including Beech, Hickory and Oak. Some areas have pure oak stands (McLaren, pers. comm.). Some of the herbaceous plants found on the floodplain include: False Mermaid (Floerkea proserpinacoides) and Wild Garlic (Allium canadense) (McLaren, pers. comm.).

The O.W.R.C. (1968) found that the Welland River was "impaired" in Binbrook Township, with fairly high levels of organic pollution. This usually leads to lowered dissolved oxygen levels. The water quality suggests that a warm-water fauna, tolerant of some pollution would be expected. Two important species present include: Northern Pike (Esox lucius) and Largemouth Bass (Micropterus salmoides) (MNR, Sensitive Areas Mapping).

The surficial deposits are lacustrine silts and clays, overlying clay till and the alluvial deposits of the creeks. The till occurs at the surface in places. Alberton silt loam soil, of variable drainage, occurs in the valley bottoms and has developed from the alluvial

deposits. A variety of soils occur in the remainder of the area. For the most part they are imperfectly-drained, with poorly-drained areas adjacent to the creeks and a few patches of well-drained soil occur on the steeper slopes. The major soils are: the poorly-drained Lincoln silty clay loam developed on clay till, the imperfectly-drained Binbrook silt loam developed on lacustrine silt over till, the imperfectly-drained Beverly silt loam developed on lacustrine silts and clays, and the imperfectly-drained Haldiman silty clay loam developed on clay till. Patches of well-drained Brantford silt loam developed on lacustrine deposits of silt and moderately well-drained Smithville silt loam developed on lacustrine silts and clays over clay till, also occur.

The slope is relatively flat (up to 2%), although 5% slopes occur adjacent to the creek in the northwest section.

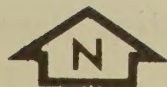
The bedrock, of Guelph dolomite and Salena shale, yields good quantities of sulphur-bearing water. The aquifer rests near the bedrock surface and is overlain by about 50 feet of clay. A shallow layer of gravel overlies the bedrock and it may facilitate the flow of groundwater in a southern direction.



37

Topographic Map Reference - BLACKHEATH 30M/4c Edition 2

Military Grid Reference - 992688



0 SCALE 1 : 25,000 1 Mi

ecologistics limited

1976

CRITERION FULFILLED - 6

Criterion Six

Red-headed Woodpecker (Melanerpes erthrocephalus)

(Found in June 1976 - Wormington, pers. comm.). The nests are excavated in the dead wood of a tree, telephone pole, or fence post. The habitat of open woods, burntlands, groves and scattered trees in open places is general and widespread (Godfrey, 1966). This is one of five known breeding locations. Other pairs may be scattered through Glanbrook Township (Curry, pers. comm.).

Swamp Sparrow (Melospiza georgiana)

(Found in June 1976 - Wormington, pers. comm.). Nests are placed in a tussock of marsh vegetation or low in a bush and in breeding season the bird is found in wetlands solely (Godfrey, 1966). Five breeding stations are known in the Hamilton-Wentworth Region.

Bullfrog (Rana catesbeiana)

(Found in June 1976 - Niagara Peninsula Conservation Authority). This large frog has been commercially-depleted at a number of southern Ontario locations, and requires some protection. For breeding, permanent deep water and shoreline cover are required.

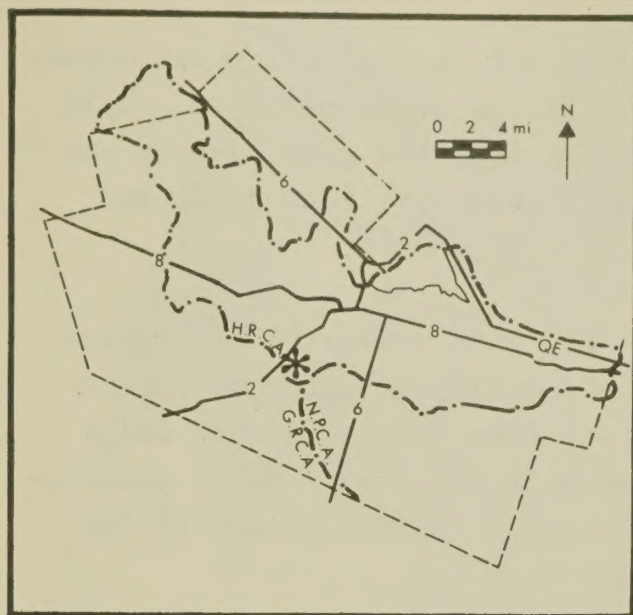
Swamp White Oak (Quercus bicolor)

(Found in June 1976 - Niagara Peninsula Conservation Authority). This oak prefers moist soils and low sites. This uncommon tree is close to the north end of its Canadian range, in the Hamilton-Wentworth Region (Hosie, 1969).

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE		
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	●	
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

A detailed field inventory is necessary in this area. Indications are that this area may fulfil more criteria than just one but substantive data is lacking.



NAME

Hamilton Golf and Country Club

CONSERVATION AUTHORITY

Hamilton Region

CATEGORY

B

OWNERSHIP

Private

SIZE

326 acres

LOCATION

In the urban section of the Town of Ancaster immediately north of the 403 Expressway.

GENERAL DESCRIPTION

The golf course and woodlots are located in the urban area of Ancaster and are now surrounded by urbanization. The eastern edge of the golf course contains a large, healthy woodlot with many large white pine trees.

The area is drained by and occurs in the upper reaches of the Ancaster Creek. Adjacent to the river the land slopes to over 15% but higher areas are in the 5 to 9% slope range.

The major surficial deposit is lacustrine sand with some clay and silt. A small area of till occurs in the north section and alluvium is found along the creek.

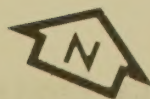
The soil developed on the alluvium is Alberton silt loam, of variable drainage. Adjacent to the creek is a belt of Grimsby sandy loam and Brant silt loam, both of which are well-drained and have developed on lacustrine sands and silts. On the higher ground, in the south, occurs well-drained Springvale sandy loam developed from lacustrine sands

over outwash gravels. At the north end and west of the river occurs the well-drained Ancaster silt loam that has developed from a till. A soil complex of Grimsby sandy loam and Ancaster silt loam in the east and north and the poorly-drained Toledo silt loam developed from lacustrine silt and clay.

The depth to bedrock varies considerably with this area of complex surficial deposition. The presence of locally occurring sand and gravels would seem to make infiltration significant but the water yield is too low to consider the area as an aquifer. Field observations are necessary in this case, to assess the importance of the area for providing groundwater infiltration.



Military Grid Reference - 834852



1 Mi

1976

CRITERION FULFILLED - 6

Criterion Six

Tufted Titmouse (Parus bicolor)

(Ancaster - 2 adults, 3 young - Wood Duck 27(1):16). This southern bird is a scarce permanent resident in southern Ontario and is not found elsewhere in Canada. It prefers deciduous and mixed woodlands and nests in holes in the trees. It may be found in residential areas where there is adequate tree growth (Godfrey, 1966). The large woods in this golf course is the only known Regional nesting area and birds have been there every year recently (Curry, pers. comm.).

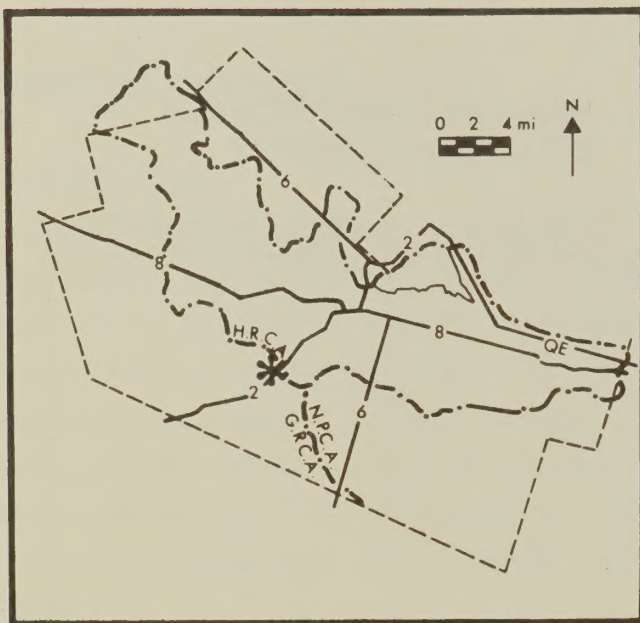
Pine Warbler (Dendroica pinus)

(Hamilton Golf and Country Club - found in large white pine - Curry, pers. comm.). Found in pine woodlands in the nesting season with the nest placed from 10 feet upwards from the ground (Godfrey). An uncommon warbler of big pines that was once common around Hamilton (McIlwraith, 1886). One of only 2 Regional nesting areas but may be more common than this indicates (Curry, pers. comm.).

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE		
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	●	
AIR POLLUTION	●	●
STREAM POLLUTION		
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

The large woodlot is not developed at present and changes in this community would probably endanger the breeding status of the Tufted Titmouse.



NAME

Jerseyville Road Woodlot

CONSERVATION AUTHORITY

Grand River

CATEGORY

C

OWNERSHIP

Private

SIZE

424 acres

LOCATION

On the western edge of the urbanized section of the Town of Ancaster.

GENERAL DESCRIPTION

This large, wooded area forms the headwaters for one of the tributaries of the Big Creek. At their heads the stream valleys are very steep with slopes ranging between 15 to 30%. Between the stream courses the slopes range between 5 to 15% with the flatter areas occurring towards the west.

The surficial deposit is glaciolacustrine sands with some silt. Alberton silt loam occurs along the creek bottom. This soil is of variable drainage and has developed from the silt clay alluvium. The major soils occurring between the creeks are complexes of well-drained Grimsby sandy loam and well-drained Brant silt loam, both developed from lacustrine sands and silt. Small areas of poorly-drained Flamboro sandy loam also occurs, developed from lacustrine sands. The imperfectly-drained Tuscola silt loam is found in small areas adjacent to the stream courses.

The bedrock is covered by a thick and variable deposition of clay, silt and sand. Bedrock water is negligible in supply but water wells occasionally strike water-bearing surficial deposits yielding fair to moderate quantities. The infiltration capability of the ground is significant, at least in localized areas, but the groundwater storage in bedrock is limited.

The Pine Elfin Butterfly (Incisalla nippon) has been collected here (June 21, 1969) (Wormington, pers. comm.) on the west side of Shaver Road in the sensitive area. Because of its preference for dry pine woods, it occurs to the north and far to the south of the Region. This is probably the only regional record.



39

Topographic Map Reference - JERSEYVILLE 40P/1h Edition 1

Military Grid Reference - 797842



SCALE 1 : 25,000

1 Mi

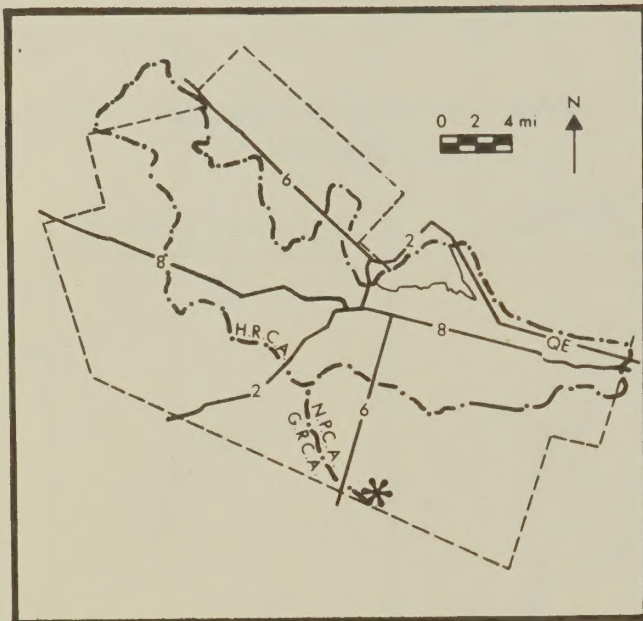
ecologistics limited

1976

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE		
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	●	
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

This area must be studied in the field, in detail in order to ascertain its true status. Botanical and faunal surveys are of particular importance.



NAME

Tyneside Woodlot

CONSERVATION AUTHORITY

Niagara Peninsula

CATEGORY

C

OWNERSHIP

Private

SIZE

58 acres

LOCATION

In the Township of Glanbrook north of the hamlet of Tyneside.

GENERAL DESCRIPTION

This small, lowland woodlot is found along the Welland River. Three main tributaries come together at this point.

Much of the area is recent alluvium deposited by river action. The surficial deposit between the river channels is lacustrine silt and clay.

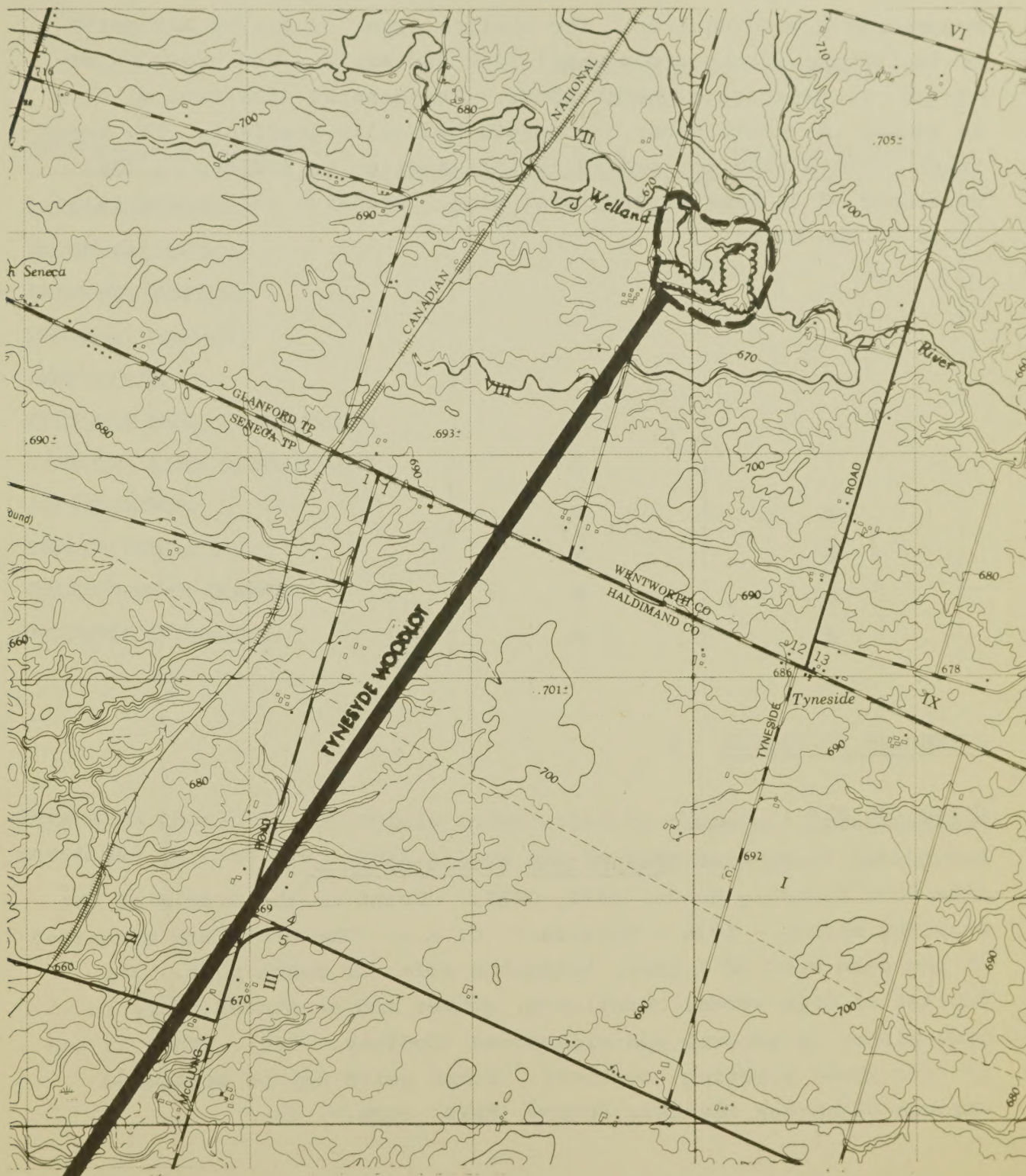
The soil developed on the alluvial deposits of the river bottoms, is the alberton silt loam, of variable drainage. Between the channels, on the higher ground, is the well-drained Brantford silt loam developed on the lacustrine deposits.

The area is moderately to strongly rolling with a slope range of 5 to 15%. The steepest slopes form the valley sides.

A typical vertical profile for nearby wells is as follows: brown clay (0 to 15 feet), blue clay (15 to 70 feet), gravel (70 to 75 feet) and bedrock at 75 feet down. Specific capacities average about 1.0,

HAMILTON - WENTWORTH REGION
ENVIRONMENTALLY SENSITIVE AREAS STUDY

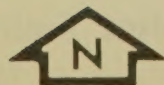
AREA
NO . **40**



40

Topographic Map Reference - CALEDONIA 30M/4d Edition 2

Military Grid Reference - 90/738



SCALE 1 : 25,000

1 Mi

ecologistics limited

1976

suggesting a good aquifer. The shallow layer of gravel may serve to facilitate easier groundwater flow and explain why groundwater has not migrated into deeper zones. The general direction of flow is toward the south under a moderate hydraulic gradient. The importance of this area for providing infiltration is limited by the existence of 70 feet of surficial clay. Recharge must occur in areas to the north.

CRITERION FULFILLED - 6

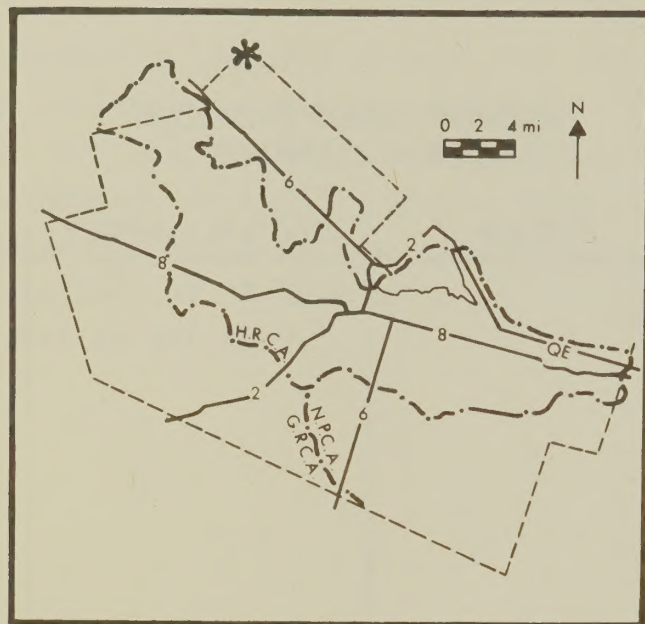
Criterion Six

Red-headed Woodpecker (Melanerpes erthrocephalus)
(Glanford Township Woods, 1970, ONRS. Found in the middle of the breeding season - 1976 - Niagara P. C. A.). The nests are excavated in the dead wood of a tree, telephone pole, or fence post. The habitat of open woods, burntlands, groves and scattered trees in open places is general and widespread (Godfrey, 1966). This is one of five known breeding locations. Other pairs may be scattered through Glanbrook Township (Curry, pers. comm.).

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE		
EXTENSIVE LAND DEVELOPMENT		
INTENSIVE LAND DEVELOPMENT	●	
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

This area should be thoroughly inventoried by competent, professional personnel so that its actual status can be ascertained.



NAME

Mountsberg Wildlife Area

CONSERVATION AUTHORITY

Halton Region

CATEGORY

A

OWNERSHIP

Public
(Halton Region Conservation Authority)

SIZE

856 acres (in the H-W Region)

LOCATION

In the northeast corner of the Region. The Wildlife Area straddles the boundaries between Wellington County, Halton Region and the Hamilton-Wentworth Region.

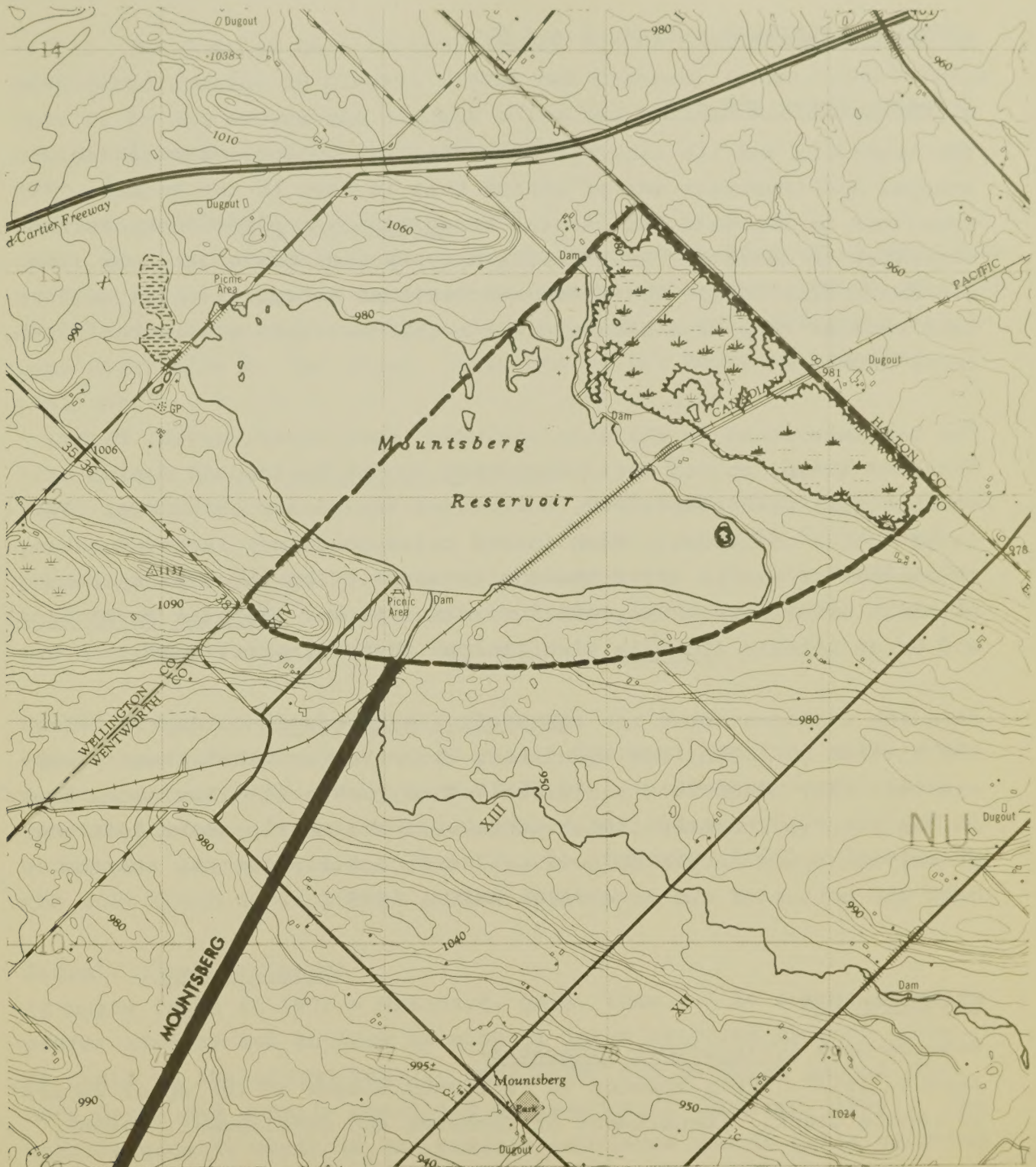
GENERAL DESCRIPTION

Mountsberg Wildlife Area is a natural site managed by the Halton Region Conservation Authority. A shallow reservoir provides excellent water-fowl habitat. The upland areas contain a variety of fields and forests.

The land to the east is primarily one of till deposits that is shallow to bedrock in places. Limestone outcrops occur. Drainage to the west is impeded by a series of drumlins, through which flows the reservoir outlet water. Organic deposits are found in the wet forests.

Well-drained Guelph loam has developed on the drumlin's loam till. Well-drained Dumfries loam has developed on the gravelly sandy loam till surrounding the drumlin. Killeen loam occurs in the North corner, also developed from gravelly sandy loam. The slopes approach 15% on the drumlins but most of the area ranges from 2 to 5% slope with many flat swamps.

The presence of randomly deposited sand, gravel and silt overlying a bedrock surface that is locally near the surface suggests that moderate to high infiltration may occur from the reservoir.



41

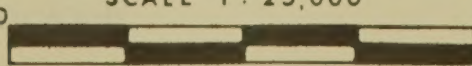
Topographic Map Reference - FREELTON 40P/8h Edition 2

Military Grid Reference - 780122



SCALE 1 : 25,000

1 Mi



ecologistics limited

1976

CRITERIA FULFILLED - 3, 4, 6 and 8

Criteria Three and Four

The reservoir and its associated marshes and wooded swamps is an unusual and important set of habits that is rare in the Region. The reservoir is man-made but careful management has allowed the natural ecosystem to develop. As a result many species now occur here, that are Regionally rare. The freshwater marshes are particularly important because they have been and are being destroyed elsewhere (North, pers. comm.).

The habitats found on the site include: open water, marsh, river, forested swamp, upland deciduous woods, young field, old field, shrub field, pine plantation, cultivated fields and buildings. The large number of habitats mean that a correspondingly large number of species of plants and animals also occur. Two uncommon species of plant occur here. They are: Cardinal Flower (Lobelia cardinalis) and Great Lobelia (Lobelia siphilitica) (Hutton, pers. comm.).

Sampling stations above the reservoir (HaRCA station 1 and 2, 1972; MNR station C1 1972b; MOE Mountsberg Creek) showed that summer temperatures stay below 24°C and dissolved oxygen levels stay above 5 mg/l. In the Reservoir summer temperatures were frequently above 24°C but dissolved oxygen levels below 5 mg/l only occurred at one station, near the bottom of the reservoir (HaRCA, 1973).

Criterion Six

Redside Dace (Clinostomus elongatus) (HaRCA, 1972). This species is "a common minnow of the upper waters" of Bronte Creek. (Department of Commerce and Development, 1960b).

The Redside Dace is a spring spawner. It prefers cool, clear streams with gravelly bottoms. It is quite sensitive to turbidity and is much less common than 30 years ago. It is restricted, in Canada, to the clear streams flowing into western Lake Ontario (Scott and Crossman,

ecologistics limited

1976

1973). The Redside Dace is included as one of Canada's rare and endangered species by Stewart (1974) but Crossman (pers. comm.) feels that it is not endangered but has a limited habitat and that this habitat is threatened in certain areas.

American Coot (Fulica americana)

(Nest in considerable numbers - Bryant, Wood Duck 24(4):8). This more or less colonial nester is found in freshwater marshes, ponds, sloughs, lakes and slow rivers (Godfrey, 1966) that have well developed marsh-type vegetation on the edges. Only one of two Regional breeding stations.

Pied-billed Grebe (Podilymbus podiceps)

(Nest in considerable numbers - Bryant, Wood Duck 24(4):8, nest every year - Wernaart, pers. comm.). Found in the summer in freshwater ponds, sloughs, sluggish streams, shallow bays, all with margins or islands of emergent and aquatic vegetation (Godfrey, 1966). One of two breeding stations in the Region.

Hooded Merganser (Lophodytes cucullatus)

(Nests in Wood Duck boxes every year - Wernaart, Hutton, pers. comm.; 4 young out of nest - Wood Duck 23(3):36. In nesting season this species is found in freshwater ponds, lakes and rivers in or near woodland. It nests in a hole in a tree (Godfrey, 1966). This is the only known nesting area in the Region.

Gadwall (Anas strepera)

(2 nests found in 1975 - Wernaart, pers. comm.). In summer Gadwalls prefer sloughs and shallow margins of lakes bordered by good cover. It nests on the ground usually near water but on drier ground than most ducks and usually concealed by vegetation (Godfrey, 1966). The species usually nests in the prairie provinces and is quite uncommon as a nester this far east (Godfrey, 1966). This is the only known nesting area in the Region.

Yellow-bellied Sapsucker (Sphyrapicus varius)

(Westmore, ONRS - nest in hole in yellow birch, 1972). In breeding season it prefers deciduous or deciduous coniferous woodlands, particularly where poplars and birches are important components. The birds nest in a cavity excavated by the birds in a tree (Godfrey, 1966). This is one of two Regional nesting sites and the first recorded for the Region (Westmore, ONRS).

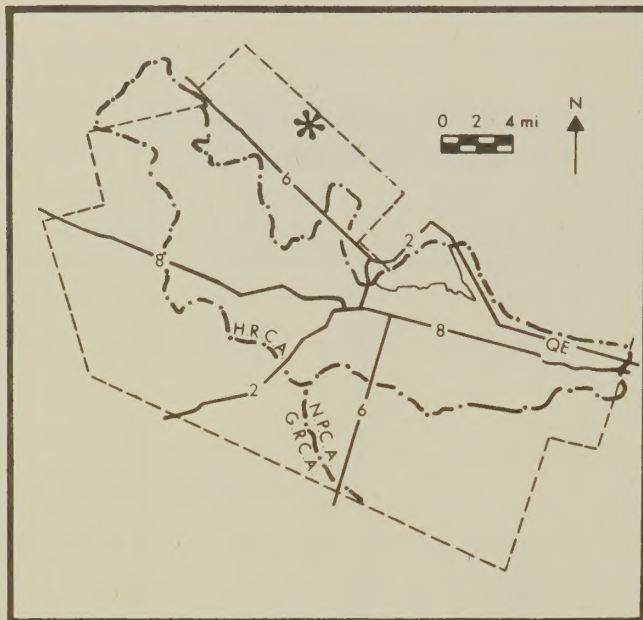
Criterion Eight

The area is particularly suited for conservation education purposes. The Halton Region Conservation Authority has established an active interpretive program based upon the areas natural features and it is heavily used by local boards of education.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE		
EXTENSIVE LAND DEVELOPMENT	•	
INTENSIVE LAND DEVELOPMENT	•	
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•

Many areas within this particular sensitive area can sustain heavy amounts of passive recreation, but certain areas can sustain very little. Some forms of use could be particularly disruptive to the waterfowl during their breeding season in the spring and early summer.



NAME

Bronte Creek Ravine

CONSERVATION AUTHORITY

Halton Region

CATEGORY

A

OWNERSHIP

Private

SIZE

249 acres

LOCATION

On the eastern side of the Region, east of Carlisle.

GENERAL DESCRIPTION

The Bronte Creek flows through a steep-sided, wooded ravine in this area. This is the start of the Bronte Creek ravine that extends all the way to the Lake Ontario shoreline in Oakville. A number of tributaries enter Bronte Creek in this area.

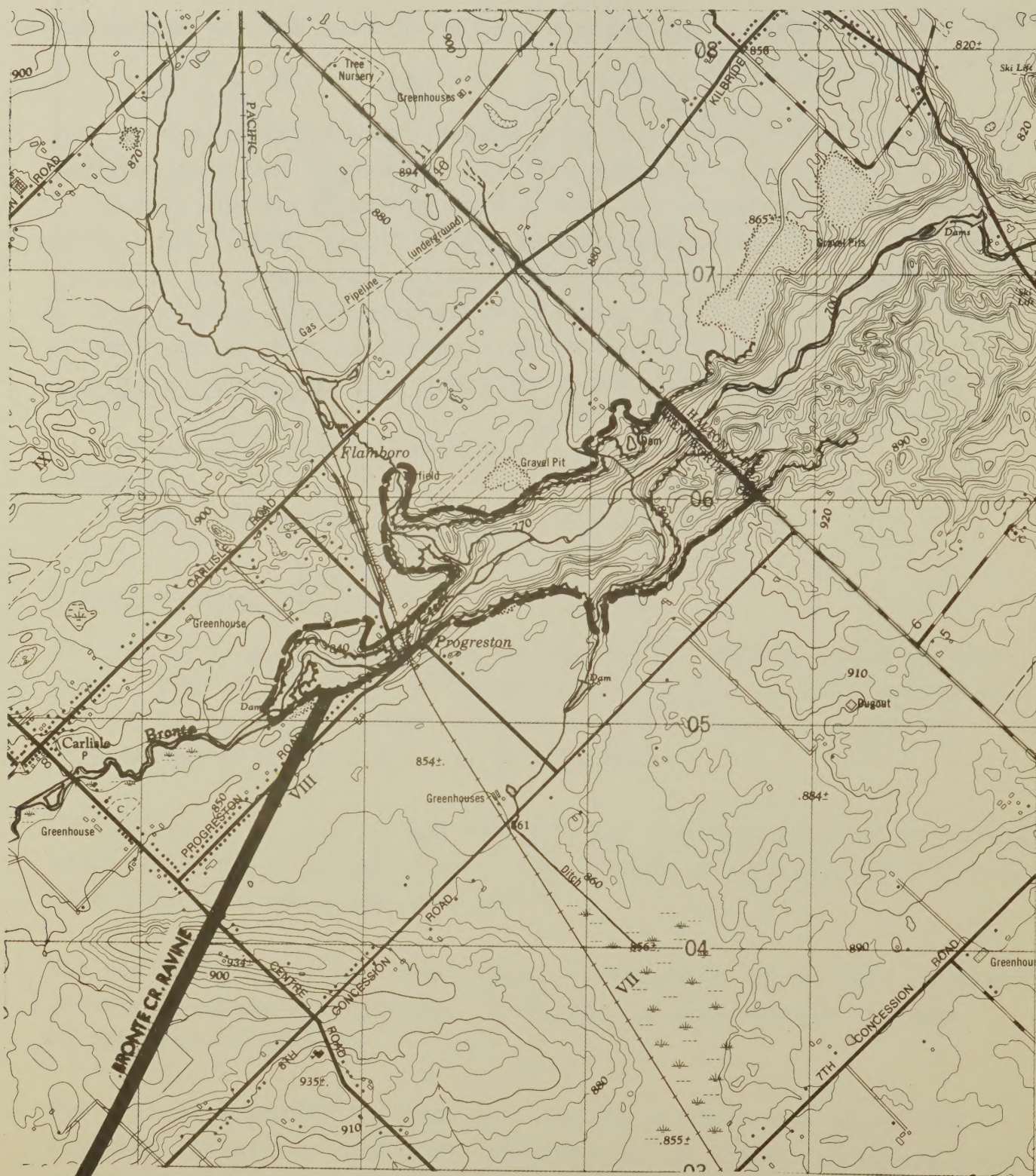
The slopes of the ravine are over 15% and the kame area is very steeply sloping in the 15 to 30% range. The tablelands adjacent to the ravine have slopes in the range of 2 to 9%.

The surficial deposits of the area include sands of various origins - lacustrine, kame and outwash. A deposit of kame gravel is found on the Region border.

The area is dominated by the creek valley in which are deposited alluvial sediments. The soils surrounding the creek and ravine have developed from sands and gravels. They are well-drained and include: Burford loam, Grimsby sandy loam and Springvale sandy loam. Well-drained Donnybrook gravelly loam has developed on the kame gravels.

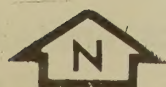
The local groundwater aquifer has good production and the Bronte Creek water quality is good.

Ecological studies associated with Bronte Creek Provincial Park have shown that the ravine with its varieties of slope, incident sunlight, moisture and temperature contains a high diversity of biological communities (MacDonald and Shrieber, 1972; Eagles 1975). Many of the plants found on the warm, south and west-facing slopes are normally found farther south. This type of condition probably also occurs here and the possible presence of rare creatures such as the Wood Turtle (Clemmys insculpta) and White Trout Lily (Erythronium albidum) should be investigated.



Topographic Map Reference - CEDAR SPRINGS 30M/5e Edition 2

Military Grid Reference - 850059



SCALE 1 : 25,000

1 Mi

ecologistics limited

1976

CRITERIA FULFILLED - 2, 3, 5 and 6

Criterion Two

The hydraulic gradient is generally the same as the bedrock slope, which dips steeply into Bronte Creek. The average specific capacity exceeds 2.0. Therefore the aquifer is good. One would suspect considerable discharge into either the present creek, or the bedrock below the present creek. The moderate velocity of groundwater movement and the presence of local gravel aquifer adjacent to the stream channel probably accounts for the shallow penetration of water into the bedrock fractures of the Wiarton domomite.

The probable zones of infiltration supplying water to this system are the outcrop complex to the north and the sand plain and Waterdown moraine to the south.

The Bronte Creek area fulfils the hydrogeologic criteria for a sensitive area in that groundwater discharge occurs here.

Criterion Three

Water Quality

Two water quality stations in the Ravine (MNR (1972b) station 4; MNR (1974) station 10), one just above the Ravine (MNR (1972b) station 3, MNR (1974) station 11) and one on a tributary entering the Ravine at Progreston (MNR (1974) station 25) showed high dissolved oxygen levels, but frequent summer temperatures above 24°C. These high temperatures seem to conflict with the fact that the Ravine is considered Brook Trout habitat. The Ravine section of Bronte Creek was designated in 1960 as having intermediate temperatures: "Brook Trout water in spring, but summer temperatures often unfavourable" (Department of Commerce and Development, 1960b). Thus, trout may leave the Ravine at times during the summer. Also, it seems likely that temperatures decrease through the Ravine, since a station just downstream (MNR (1973b) station 6 and MNR (1974) station 30) recorded lower summer temperatures than the Ravine stations, with continued high dissolved oxygen levels.

Bronte Creek Ravine

Fish Populations

As well as those species described below, a number of common species have been found in or immediately above this section of Bronte Creek (MNR, 1972). The common species are: Common Shiner, Bluntnose Minnow, Fathead Minnow, Blacknose Dace, Longnose Dace, Creek Chub, White Sucker, Northern Hog Sucker and Fantail Darter.

Brown Trout (Salmo trutta)

(MNR (1972a); MNR (1974)). There is a good Brown Trout population in the Bronte Creek Ravine, but whether all or part of the Ravine is included is indefinite. According to the Management Plan for Bronte Creek (MNR, 1972a) the "heaviest population" is between Carlisle and Lowville, while according to the MNR (1974) stream survey report, the "good population" extends only as far as Progreston from Lowville. Brown Trout were stocked in Bronte Creek by the MNR from 1953 to 1959 (MNR, 1974).

The Brown Trout is a very valuable sport fish, growing in popularity (it was once less favoured because it is difficult to catch and because it was thought to compete with Brook Trout). It spawns in late fall and early winter, and has similar habitat requirements to the Brook Trout. However, the Brown Trout can withstand higher temperatures than the Brook Trout, and is therefore found in the lower reaches of streams that are unsuitable for Brook Trout (Scott and Crossman, 1973).

Brook Trout (Salvelinus fontinalis)

(MNR (1972a); MNR (1974)). Brook Trout occur throughout the Ravine (from Cedar Springs upstream) (MNR (1972a)), but are found more often above Progreston (MNR (1974)). They have been stocked in Bronte Creek from 1963 to 1973 (every year) by the MNR (MNR (1974)).

The Brook Trout is a very popular and highly valued game fish in eastern Canada; it is, to most people, the most valuable fish found in the

Hamilton-Wentworth Region. Spawning takes place in late summer and early fall. It inhabits "clear, cool, well-oxygenated streams and lakes" (Scott and Crossman, 1973). It is very sensitive to high temperatures and low oxygen concentrations; in fact the division between cold-water and warm-water streams is primarily based on Brook Trout requirements.

Redside Dace (Clinostomus elongatus)

(MNR (1972b), station 3). This species is "a common minnow of the upper waters" of Bronte Creek (Department of Commerce and Development, 1960b).

The Redside Dace is a spring spawner. It prefers cool, clear streams with gravelly bottoms. It is quite sensitive to turbidity and is much less common than 30 years ago. It is restricted, in Canada, to the clear streams flowing into western Lake Ontario (Scott and Crossman, 1973). The Redside Dace is included as one of Canada's rare and endangered species by Stewart (1974) but Crossman (pers. comm.) feels that it is not endangered but has a limited habitat and that this habitat is threatened in certain areas.

Rainbow Darter (Etheostoma caeruleum)

(MNR (1972b), station 4). This small species (2 inches) is found in clear streams with gravelly bottoms, often in fairly large streams, but shallow areas are needed for spawning. It spawns in the spring. The Rainbow Darter is important as a pollution indicator, because it is extremely sensitive to chemical pollution and to silting (Scott and Crossman, 1973).

Criterion Six

Great Blue Heron (Ardea herodias)

(Heronry in this ravine forest - Glooschenko, pers. comm.). Nests in colonies in deciduous, coniferous, and mixed woodlands which are sometimes considerable distances from water (Godfrey, 1966). The adults fly to bodies of water where fish and amphibians are caught as food

for the young. The nesting colonies are very sensitive to human disturbance. Human disturbance in the nesting colony has been know to cause severe chick mortality (Howell, pers. comm.). This is one of two or three Great Blue heronries but one more may occur in the south of Glanbrook Township (Smith, pers. comm.).

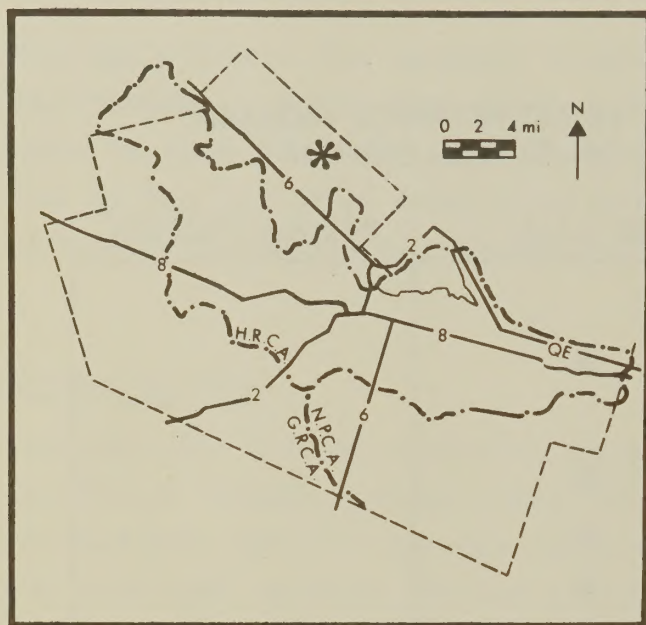
Criterion Five

The area has a high community diversity which includes: upland deciduous forest; upland mixed forest; upland conifer forest; pine plantation; lowland conifer swamp; field and shrub community and old orchards (Attack, Halton Region Conservation Authority).

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION	•	
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY	•	
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT	•	
INTENSIVE LAND DEVELOPMENT	•	
AIR POLLUTION	•	•
STREAM POLLUTION	•	•
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•

The steep ravine slopes are especially susceptible to erosion and disturbance. The dense forest cover helps to keep the temperatures down in the Bronte Creek.



NAME

Carlisle Swamp

CONSERVATION AUTHORITY

Halton Region

CATEGORY

B

OWNERSHIP

Private

SIZE

317 acres

LOCATION

Between Carlisle and Flamboro Centre in the Township of Flamborough.

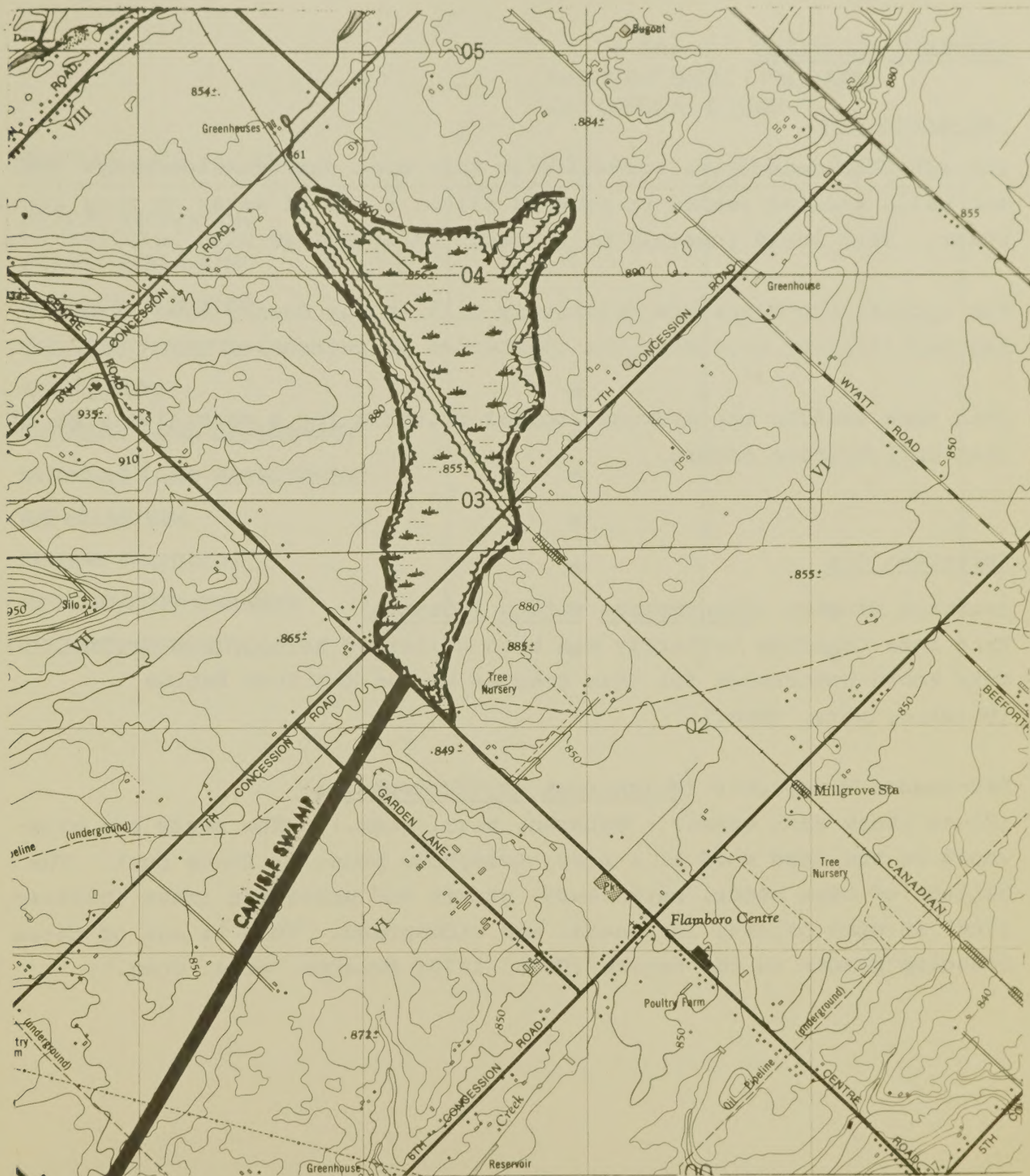
GENERAL DESCRIPTION

This is a low, wet forest. It serves as the headwaters of two creeks. One flows north into Bronte Creek and the other flows south into Grindstone Creek.

The area is one of surficial sand deposits of lacustrine and outwash origin. Most of the soil is organic muck that has accumulated due to the wet conditions. The surrounding area has well-drained soils that include the Grimsby sand loam, Guelph and Farmington loam till. In places the soils are shallow to bedrock, as is the case of the Farmington loam which has less than 12 inches of loam till over bedrock.

Most of the area is flat but adjacent slopes are in the 5 to 9% range.

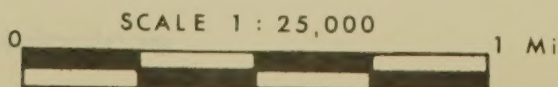
Large wetlands are scattered through the Township of Flamborough but are uncommon in the Region as a whole.



43

Topographic Map Reference - CEDAR SPRINGS 30M/5e Edition 2
DUNDAS 30M/5d Edition 3

Military Grid Reference - 854031



ecologistics limited

1976

CRITERIA FULFILLED - 2 and 6

Criterion Two

The specific capacities for wells in this area vary considerably. All the wells studied seemed to produce either a lot of water or very little water. This could possibly be a result of localized high infiltration.

The hydrostatic heads are relatively high in the nearby area, suggesting infiltration providing the overburden is permeable.

This area fulfils the hydrogeological criteria for a sensitive area in that infiltration occurs.

Criterion Six

Inornate Ringlet (Coenonympha tullia inornata)

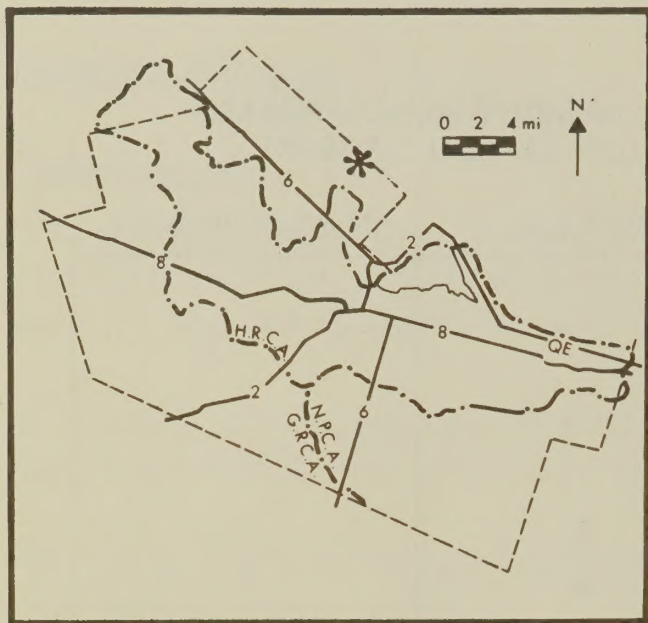
This rare Canadian butterfly has been collected here. This is the only known occurrence for this species in the Hamilton Region.
(McLaren, pers. comm.).

Red-headed Woodpecker (Melanerpes erythrocephalus)

(Found there each summer - McLaren, pers. comm.). The nests are excavated in the dead wood of a tree, telephone pole, or fence post. The habitat of open woods, burntlands, groves and scattered trees (Godfrey, 1966) in open places, is general and widespread. This is one of three breeding places in the Region (ONRS, 1970; McLaren, pers. comm.).

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	•	
EXTENSIVE LAND DEVELOPMENT	•	
INTENSIVE LAND DEVELOPMENT	•	
AIR POLLUTION	•	
STREAM POLLUTION	•	
GROUNDWATER CHANGES	•	•
RESOURCE EXTRACTION	•	•



NAME

Lake Medad

CONSERVATION AUTHORITY

Halton Region

CATEGORY

B

OWNERSHIP

Private

SIZE

420 acres

LOCATION

On the eastern edge of the Region, north of Waterdown.

GENERAL DESCRIPTION

This extensive forest continues, along a minor escarpment, north into Halton Region. Lake Medad itself is just east of the Halton border. The lake and surrounding forests are the headwaters of the Grindstone Creek.

The major surficial deposit is sand of lacustrine and outwash origin, with patches of clay loam till. Most of the area is low lying and contains an accumulation of organic muck. Poorly-drained Jeddo loam soil accurs to the west. Well-drained Springvale sandy loam occurs to the north. It has developed from sand over outwash.

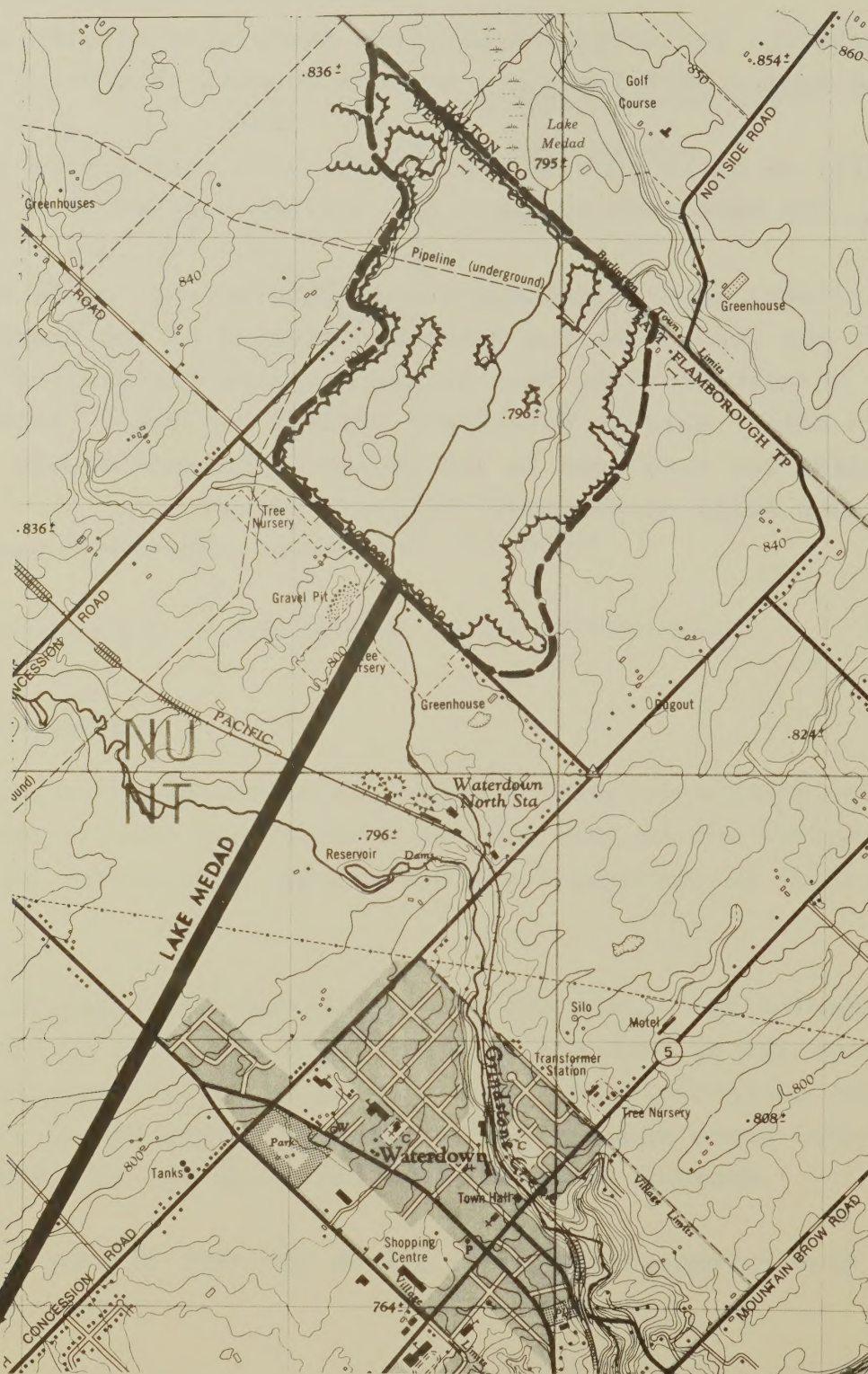
Most of the area is flat but at the north end steeper slopes occur in the 2 to 5% range.

Groundwater is flowing into the area from the northwest and from the east. Most wells nearby draw reasonable supplies of groundwater from the bedrock aquifer. The Waterdown moraine and local bedrock outcrops to the east probably supply considerable infiltration. The area to

to the northwest, including the Carlisle Swamp also provide infiltration to the system that feeds the bedrock beneath this forest.

Water quality is quite good in the forest, with fairly warm temperatures (DLF, 1971; MOE Waterdown station; MNR (1975e) station 3).

McIlwraith (1886) reported that Cerulean Warbler was "quite common and breeding in the woods near the Waterdown station of the Grand Trunk Railway". He also mentions that Yellow-breasted Chats breed near an old, unused mill - rare at Waterdown (McIlwraith, 1886). Both of these southern birds are very rare in the Region. The area should be checked to see if they still occur today, 90 years later.



44

Topographic Map Reference - DUNDAS 30M/5d Edition 3

Military Grid Reference - 897015



SCALE 1 : 25,000

1 Mi

ecologistics limited

1976

CRITERION FULFILLED - 6

Criterion Six

Bullfrog (Rana catesbeiana)

(M. Shivas, pers. comm. to P. Eagles, 1976). This large frog has been commercially-depleted at a number of southern Ontario locations, and requires some protection. For breeding, permanent deep water and shoreline cover are required.

Timber Rattlesnake (Crotalus horridus horridus)

(Logier 1939, 42). Formerly, this large reptile occurred here, but there have been no reports for many years.

Long-eared Owl (Asio otus)

(Waterdown - Wood Duck 22(2):23). The nests are in woodland, usually 10 to 30 feet up in a tree in an old hawk or crow nest. The habitat is usually the denser parts of woods (not necessarily extensive) the preferred being coniferous or mixed woods (Godfrey, 1966). This is one of six Regional nesting stations but the birds are probably no longer present in Westdale Park.

NEGATIVE IMPACT PROBABLE
ON CRITICAL ELEMENTS

DISTURBANCE FACTORS	IN E.S.A.	IN E.S.A. VICINITY
PASSIVE RECREATION		
ACTIVE RECREATION		
EXTENSIVE FORESTRY		
INTENSIVE FORESTRY		
AGRICULTURE	●	
EXTENSIVE LAND DEVELOPMENT	●	
INTENSIVE LAND DEVELOPMENT	●	
AIR POLLUTION	●	●
STREAM POLLUTION	●	●
GROUNDWATER CHANGES	●	●
RESOURCE EXTRACTION	●	●

APPENDICES

TABLE OF CONTENTS

1. Breeding Birds of the Hamilton-Wentworth Region	1
2. Amphibians and Reptiles of the Hamilton-Wentworth Region	14
3. Mammals of the Hamilton-Wentworth Region	18
4. Fish Species and Water Quality of the Hamilton Wentworth Region	23
5. Unusual Plants of the Hamilton-Wentworth Region	30
6. Acknowledgements	35
7. Proposal and Terms-of-Reference	37

APPENDIX 1

BREEDING BIRDS OF THE HAMILTON-WENTWORTH REGION

In the Hamilton-Wentworth Region the breeding season for birds extends from late winter through spring to early summer. The vast majority of species nest in June. The survival of each species is dependent upon nesting success and the survival of the young. The population level of all species reaches a peak during the nesting seasons and declines through the rest of the year. Therefore, it is important that breeding habitats are protected if populations are to have a chance to maintain themselves.

Birds are generalists in their habitat requirements through much of the year and this is especially evident with the strongly migratory species. In the breeding season, each species has specific habitat and resource needs that must be fulfilled if nesting and the production of young is to take place. An example of such precise habitat requirements can be seen with the Louisiana Waterthrush that nests in this Region. This bird requires undisturbed, natural forests that contain a fast flowing river or stream in a deep ravine or a mountainous condition for its breeding habitat (Godfrey, 1966, Woods, pers. comm. 1976). Therefore, this bird is found in our area where streams pour over the Niagara Escarpment into wooded gorges. We know of 11 breeding stations for this species in Canada of which five are in this region (Wormington, pers. comm.).

Birds fill a broad range of ecological niches and as such are good indicators of environmental change. For example, the lake shore marshes in this Region are all but completely gone now due to industrial and urban development. As a result, the birds that breed in these habitats are becoming correspondingly scarce (North, pers. comm.). In 1886 Thomas McIlwraith wrote the little

Bittern is common enough in suitable places all around the bay. Today this bird, now called the Least Bittern, nests in only three places in the entire Region (i.e. Van Wagner's Beach, Cootes Paradise and Valen's Conservation Area) (McLaren, pers. comm.). Two of these are in the Burlington Bay Area. Other marsh nesters have suffered similar fates.

The National Audubon Society recently published the Blue List for 1976. The Blue List is made up of those species which in all or in a significant part of their range, currently exhibit potentially dangerous, apparently non-cyclical population declines (Arbib, 1975). The Hamilton-Wentworth Region contains breeding records for several species that occur on this Blue List. Most of these species are quite rare as breeders, a couple are extinct as local breeders and a few could be considered to be common.

The following list contains those species on the Blue List that presently are or have been known to breed in the Hamilton-Wentworth Region. All breeding populations should be looked at with careful scrutiny.

<u>Species</u>	<u>Regional Breeding Status</u>
Red-necked Grebe	Extinct ¹
Black-crowned Night Heron	Rare
American Bittern	Rare
Cooper's Hawk	Rare
Red-shouldered Hawk	Rare
Marsh Hawk	Rare
American Kestrel	Common
King Rail	Extinct
Piping Plover	Extinct
Upland Sandpiper	Rare
Yellow-billed Cuckoo	Common
Short-eared Owl	Extinct

Common Nighthawk	Common
Red-headed Woodpecker	Rare
Hairy Woodpecker	Common
Cliff Swallow	Rare
Purple Martin	Common
Loggerhead Shrike	Rare
Yellow Warbler	Common
Yellow-breasted Chat	Rare
Grasshopper Sparrow	Rare
Henslow's Sparrow	Rare

¹Extinct means not now breeding in Region.

The following list is a compilation of information from several sources. The Ontario Nest Records Scheme (ONRS) at the Royal Ontario Museum in Toronto contains nest record cards that have been submitted by interested observers throughout the years. George W. North is a well-known naturalist in the Hamilton Area who is often described as being the grand master of the local bird watching circles. George has kept detailed, daily records that cover the time period from 1926 to 1970. Auchinburn Farm in the Dundas Valley has been surveyed in detail by Ms. Gartshore and a report of her findings is held in the files of the Hamilton Region Conservation Authority. The Hamilton Naturalist Club has published a monthly publication entitled the Wood Duck for many years. Many important nesting records can be found in its pages. Various observers submitted to us various nesting records that had been previously unpublished and these are found in the Others column.

- H - Hypothetical; indicating evidence of breeding but not of a conclusive nature
- N - Nesting; a record of the observation of a nest, usually with eggs and/or young
- B - Breeding; as ascertained by a competent observer
- I - Introduced; originally a species alien to Canada

- E - Extinct; as a breeding species in the Hamilton-Wentworth
Region
- C - Common; as a breeding species in the Hamilton-Wentworth
Region

The numbers to the right indicate the number of stations at which a particular species has been recorded. Only those found at 10 stations or less are numbered.

The nomenclature and sequence of species follows that of the American Ornithologists' Union Check-List of North American Birds (Fifth Edition, 1957) and the Thirty-Second Supplement (AOU, 1973).

LIST OF BREEDING BIRDS

Gart- Wood
ONRS North shore Duck Others Status

Order Podicipediformes

Family Podicipedidae

Red-necked Grebe -

Podiceps grisegena

N

E

Pied-billed Grebe -

Podilymbus podiceps

N

N

2

Order Ciconiiformes

Family Ardeidae

Great Blue Heron -

Ardea herodias

N

N

N

3

Green Heron -

Butorides virescens

N

N

C

Black-crowned Night Heron -

Nycticorax nycticorax

N

N

1

Least Bittern -

Ixobrychus exilis

N

N

3

American Bittern -

Botaurus lentiginosus

N

N

2

Order Anseriformes

Family Anatidae

Canada Goose -

Branta canadensis

B

N

N

C

Mallard -

Anas platyrhynchos

N

N

B

N

N

C

Black Duck -

Anas rubripes

N

N

B

C

Green-winged Teal -

Anas carolinensis

N

N

2

Blue-winged Teal -

Anas discors

N

N

N

C

Northern Shoveler -

Spatula clypeata

N

1

Wood Duck -

Aix sponsa

N

N

B

N

C

Lesser Scaup -

Aythya affinis

H

H

Hooded Merganser -

Lophodytes cucullatus

N

1

Gart- Wood
ONRS North shore Duck Others Status

Order Falconiformes

Family Cathartidae

Turkey Vulture -

Cathartes aura

H

H

Family Accipitridae

Cooper's Hawk -

Accipiter cooperii

B

1

Red-tailed Hawk -

Buteo jamaicensis

N

N

B

N

C

Red-shouldered Hawk -

Buteo lineatus

N

1

Marsh Hawk -

Circus cyaneus

N

B

4

Family Falconidae

American Kestrel -

Falco sparverius

N

N

B

C

Order Galliformes

Family Tetraonidae

Ruffed Grouse -

Bonasa umbellus

N

B

N

B

C

Family Phasianidae

Ring-necked Pheasant -

Phasianus colchicus

N

N

I/C

Gray Partridge -

Perdix perdix

N

I

Order Gruiformes

Family Rallidae

King Rail -

Rallus elegans

N

N

E

Virginia Rail -

Rallus limicola

N

N

B

N

4

Sora Rail -

Porzana carolina

N

N

C

Common Gallinule -

Gallinula chloropus

N

N

N

2

American Coot -

Fulica americana

N

N

N

2

Gart- Wood
ONRS North shore Duck Others Status

Order Charadriiformes

Family Charadriidae						
Piping Plover -						
<u>Charadrius melodus</u>		N				E
Killdeer -						
<u>Charadrius vociferus</u>	N	N	B	N		C
American Woodcock -						
<u>Philohela minor</u>	N	N	B	N	B	C
Upland Sandpiper -						
<u>Bartramia longicauda</u>	N			N		4
Spotted Sandpiper -						
<u>Actitis macularia</u>	N	N	B			C
Family Laridae						
Ring-billed Gull -						
<u>Larus delawarensis</u>	N				N	E
Common Tern -						
<u>Sterna hirundo</u>	N	N		N		2
Black Tern -						
<u>Chlidonias niger</u>	N	N		N		2

Order Columbiformes

Family Columbidae						
Rock Dove -						
<u>Columba livia</u>		N				I/C
Mourning Dove -						
<u>Zenaidura macroura</u>	N	N	B	N	B	C

Order Cuculiformes

Family Cuculidae						
Yellow-billed Cuckoo -						
<u>Coccyzus americanus</u>	N	N	B	N		C
Black-billed Cuckoo -						
<u>Coccyzus erythrophthalmus</u>	N	N	B	N		C

Order Strigiformes

Family Tytonidae						
Barn Owl -						
<u>Tyto alba</u>					H	H

Order Strigiformes

Family Strigidae

Screech Owl -

<u>Otus asio</u>	N	N	B	N		C
------------------	---	---	---	---	--	---

Great Horned Owl -

<u>Bubo virginianus</u>	N	N	B	N		C
-------------------------	---	---	---	---	--	---

Long-eared Owl -

<u>Asio otus</u>	N	N		N		6
------------------	---	---	--	---	--	---

Short-eared Owl -

<u>Asio flammeus</u>					N	E
----------------------	--	--	--	--	---	---

Saw-whet Owl -

<u>Aegolius acadicus</u>					N	1
--------------------------	--	--	--	--	---	---

Order Caprimulgiformes

Family Caprimulgidae

Whip-poor-will -

<u>Caprimulgus vociferus</u>		N	B			4
------------------------------	--	---	---	--	--	---

Common Nighthawk -

<u>Chordeiles minor</u>		N	B			C
-------------------------	--	---	---	--	--	---

Order Apodiformes

Family Apodidae

Chimney Swift -

<u>Chaetura pelagica</u>		N	B			C
--------------------------	--	---	---	--	--	---

Family Trochilidae

Ruby-throated Hummingbird -

<u>Archilochus colubris</u>	N	N	B			C
-----------------------------	---	---	---	--	--	---

Order Coraciiformes

Family Alcedinidae

Belted Kingfisher -

<u>Megaceryle alcyon</u>	N	N	B			C
--------------------------	---	---	---	--	--	---

Order Piciformes

Family Picidae

Common Flicker -

<u>Colaptes auratus auratus</u>		N	B			C
---------------------------------	--	---	---	--	--	---

Gart- Wood
ONRS North shore Duck Others Status

Family Picidae

Pileated Woodpecker -

<u>Dryocopus pileatus</u>	N	B	N		C
---------------------------	---	---	---	--	---

Red-headed Woodpecker -

<u>Melanerpes erythrocephalus</u>	N	N		B	5
-----------------------------------	---	---	--	---	---

Yellow-bellied Sapsucker -

<u>Sphyrapicus varius</u>	N			B	2
---------------------------	---	--	--	---	---

Hairy Woodpecker -

<u>Dendrocopos villosus</u>	N	N	B	N	C
-----------------------------	---	---	---	---	---

Downy Woodpecker -

<u>Dendrocopos pubescens</u>	N	N	B		C
------------------------------	---	---	---	--	---

Order Passeriformes

Family Tyrannidae

Eastern Kingbird -

<u>Tyrannus tyrannus</u>	N	N	B		C
--------------------------	---	---	---	--	---

Great Crested Flycatcher -

<u>Myiarchus crinitus</u>	N	N	B		C
---------------------------	---	---	---	--	---

Eastern Phoebe -

<u>Sayornis phoebe</u>	N	N	B	N	C
------------------------	---	---	---	---	---

Alder Flycatcher -

<u>Empidonax alnorum</u>				N	1
--------------------------	--	--	--	---	---

Willow Flycatcher -

<u>Empidonax traillii</u>	N				C
---------------------------	---	--	--	--	---

Least Flycatcher -

<u>Empidonax minimus</u>	N	B			2
--------------------------	---	---	--	--	---

Eastern Wood Pewee -

<u>Contopus virens</u>	N	B		B	C
------------------------	---	---	--	---	---

Family Alaudidae

Horned Lark -

<u>Eremophila alpestris</u>	N		N		C
-----------------------------	---	--	---	--	---

Family Hirundinidae

Tree Swallow -

<u>Iridoprocne bicolor</u>	N	N	B		C
----------------------------	---	---	---	--	---

Bank Swallow -

<u>Riparia riparia</u>	N	N			C
------------------------	---	---	--	--	---

Rough-winged Swallow -

<u>Stelgidopteryx ruficollis</u>	N	N			C
----------------------------------	---	---	--	--	---

Barn Swallow -

<u>Hirundo rustica</u>	N	N	B		C
------------------------	---	---	---	--	---

Cliff Swallow -

<u>Petrochelidon pyrrhonota</u>	N	B	N		3
---------------------------------	---	---	---	--	---

Purple Martin -

<u>Progne subis</u>	N	N			C
---------------------	---	---	--	--	---

Gart- Wood
ONRS North shore Duck Others Status

Family Corvidae

Blue Jay -

Cyanocitta cristata

N N B B C

Common Crow -

Corvus brachyrhynchos

N N B N B C

Family Paridae

Black-capped Chickadee -

Parus atricapillus

N N B N B C

Tufted Titmouse -

Parus bicolor

N N 1

Family Sittidae

White-breasted Nuthatch -

Sitta carolinensis

N B C

Family Certhiidae

Brown Creeper -

Certhia familiaris

N N 2

Family Troglodytidae

House Wren -

Troglodytes aedon

N N B B C

Winter Wren -

Troglodytes troglodytes

N B 3

Carolina Wren -

Thryothorus ludovicianus

N N 1

Long-billed Marsh Wren -

Telmatodytes palustris

N N 4

Short-billed Marsh Wren -

Cistothorus platensis

N N 2

Family Mimidae

Northern Mockingbird -

Mimus polyglottos

N C

Gray Catbird -

Dumetella carolinensis

N N B N C

Brown Thrasher -

Toxostoma rufum

N N B C

Family Turdidae

American Robin -

Turdus migratorius

N N B B C

Wood Thrush -

Hylocichla mustelina

N N B N C

Veery -

Catharus fuscescens

N B B 3

Gart- Wood
ONRS North shore Duck Others Status

Family Turdidae						
Eastern Bluebird -						
<u>Sialia sialis</u>	N	N	B	N		1
Family Sylviidae						
Blue-Gray Gnatcatcher -						
<u>Polioptilia caerulea</u>	N	N	B	N	B	3
Family Bombycillidae						
Cedar Waxwing -						
<u>Bombycilla cedrorum</u>	N	N	B	N		C
Family Laniidae						
Loggerhead Shrike -						
<u>Lanius ludovicianus</u>	N	N	B	N		1
Family Sturnidae						
Common Starling -						
<u>Sturnus vulgaris</u>	N	N	B		B	C/I
Family Vireonidae						
Yellow-throated Vireo -						
<u>Vireo flavifrons</u>		N		N		2
Red-eyed Vireo -						
<u>Vireo olivaceus</u>	N	N	B		B	C
Philadelphia Vireo -						
<u>Vireo philadelphicus</u>			B			1
Warbling Vireo -						
<u>Vireo gilvus</u>	N	N	B			C
Family Parulidae						
Black and White Warbler -						
<u>Mniotilta varia</u>					H	H
Prothonotary Warbler -						
<u>Protonotaria citrea</u>		N				E
Golden-winged Warbler -						
<u>Vermivora chrysoptera</u>		N	B	N	N	3
Blue-winged Warbler -						
<u>Vermivora pinus</u>			B	N	N	3
Nashville Warbler -						
<u>Vermivora ruficapilla</u>					H	H
Yellow Warbler -						
<u>Dendroica petechia</u>	N	N	B			C
Black-throated Green Warbler -						
<u>Dendroica virens</u>			B		B	2
Cerulean Warbler -						
<u>Dendroica cerulea</u>		N		N		3

Gart- Wood
ONRS North shore Duck Others Status

Family Parulidae

Chestnut-sided Warbler -

<u>Dendroica pensylvanica</u>	N	N	B	N	N/B	3
-------------------------------	---	---	---	---	-----	---

Pine Warbler -

<u>Dendroica pinus</u>		N				2
------------------------	--	---	--	--	--	---

Ovenbird -

<u>Seiurus aurocapillus</u>		N	B	N	N	C
-----------------------------	--	---	---	---	---	---

Northern Waterthrush -

<u>Seiurus noveboracensis</u>					B	2
-------------------------------	--	--	--	--	---	---

Louisiana Waterthrush -

<u>Seiurus motacilla</u>	N			N	N	5
--------------------------	---	--	--	---	---	---

Mourning Warbler -

<u>Oporornis philadelphia</u>	N			N	N	5
-------------------------------	---	--	--	---	---	---

Common Yellowthroat -

<u>Geothypis trichas</u>	N		B			C
--------------------------	---	--	---	--	--	---

Yellow-breasted Chat -

<u>Icteria virens</u>					N	3
-----------------------	--	--	--	--	---	---

Canada Warbler -

<u>Wilsonia canadensis</u>		H				2
----------------------------	--	---	--	--	--	---

American Redstart -

<u>Setophaga ruticilla</u>	N	N				C
----------------------------	---	---	--	--	--	---

Family Polceidae

House Sparrow -

<u>Passer domesticus</u>	N	N	B			C/I
--------------------------	---	---	---	--	--	-----

Family Icteridae

Bobolink -

<u>Dolichonyx oryzivorus</u>	N	N	B			C
------------------------------	---	---	---	--	--	---

Eastern Meadowlark -

<u>Sturnella magna</u>	N	N	B	N		C
------------------------	---	---	---	---	--	---

Red-winged Blackbird -

<u>Agelaius phoeniceus</u>	N	N	B		B	C
----------------------------	---	---	---	--	---	---

Orchard Oriole -

<u>Icterus spurius</u>		N		N		1
------------------------	--	---	--	---	--	---

Northern Oriole -

<u>Icterus galbula</u>	N	N	B		B	C
------------------------	---	---	---	--	---	---

Common Grackle -

<u>Quiscalus quiscula</u>	N	N	N		B	C
---------------------------	---	---	---	--	---	---

Brown-headed Cowbird -

<u>Molothrus ater</u>	N	N	B		B	C
-----------------------	---	---	---	--	---	---

Family Thraupidae

Scarlet Tanager -

<u>Piranga olivacea</u>		N	B	N		C
-------------------------	--	---	---	---	--	---

Gart- Wood
ONRS North shore Duck Others Status

Family Fringillidae

Cardinal -

<u>Richmond</u> <u>dena</u> <u>cardinalis</u>	N	N	B	N		C
Rose-breasted Grosbeak -						
<u>Pheucticus</u> <u>ludovicianus</u>	N	N	B	N		C
Indigo Bunting -						
<u>Passerina</u> <u>cyanea</u>	N	N	B			C
American Goldfinch -						
<u>Spinus</u> <u>tristis</u>	N	N	B			C
Rufous-sided Towhee -						
<u>Pipilo</u> <u>erythrophthalmus</u>		N	B			C
Savannah Sparrow -						
<u>Passerculus</u> <u>sandwichensis</u>		N		N	N	C
Grasshopper Sparrow -						
<u>Ammodramus</u> <u>savannarum</u>	N	N				C
Henslow's Sparrow -						
<u>Ammodramus</u> <u>henslowii</u>					H	H
Vesper Sparrow -						
<u>Pooecetes</u> <u>gramineus</u>	N	N	B	N	N	C
Chipping Sparrow -						
<u>Spizella</u> <u>passerina</u>	N	N	B	N		C
Clay-coloured Sparrow -						
<u>Spizella</u> <u>pallida</u>		N				1
Field Sparrow -						
<u>Spizella</u> <u>pusilla</u>	N	N	B	N	B	C
White-throated Sparrow -						
<u>Zonotrichia</u> <u>albicollis</u>					H	H
Swamp Sparrow -						
<u>Melospiza</u> <u>georgiana</u>			B		B	5
Song Sparrow -						
<u>Melospiza</u> <u>melodia</u>	N	N	B	N	B	C

APPENDIX 2

AMPHIBIANS AND REPTILES OF THE HAMILTON-WENTWORTH REGION

Reptiles and amphibians (herptiles) are cold-blooded animals, deriving body heat from outside sources and controlling their body temperature by moving to cooler or warmer environments as necessary. Reptiles lay their eggs on land and the young are miniature replicas of their parents, in general appearance, if not always in colouration and pattern. Reptiles are clad in scales, shields or plates and their toes bear claws (Conant, 1975).

Amphibians lay their eggs in water, with the exception of the red-backed salamander in this area. The young pass through a larval stage that is usually aquatic (i.e. tadpoles are aquatic frog larvae) before they metamorphose into the adult form. They have moist, glandular skin and their toes are devoid of claws (Conant, 1975).

The majority of herptiles, in this area, spend their life in a small restricted area when compared to wide travelling creatures such as birds. Their precise habitat requirements, which are most important for breeding, are usually not compatible with most man-made developments. They are highly sensitive to their environment, especially due to their cold-blooded condition. An example of such a precise habitat requirement is demonstrated by the only known station for the four-toed salamander (Hemidactylium scutatum) in this region. In April, 1963 the National Museum of Canada collected one individual of this species in the springs and trickles near the valley headwater of the Ancaster Creek. This salamander is known to prefer sphagnum moss as is found in such moist, undisturbed conditions (Conant, 1975).

Historically, herptiles have either been completely disregarded or actively destroyed. They do, however, have an essential role in the balance of nature. Lizards and amphibians are largely insectivorous, while snakes are notable for control of rodent populations (Conant, 1975). Herptiles also serve as prey species for other predators in the food chain (i.e. herons eat frogs).

The following is a list of the amphibians and reptiles that have been recorded, or are likely to occur, in the Hamilton-Wentworth Region (Wentworth County). The numbers to the right indicate the number of stations at which a particular species has been recorded. Only those found at 5 stations or less are numbered. The more common species are indicated by a c.

* - specimen in Royal Ontario Museum or National Museum of Canada, or report in literature

s.r. - sight record by reliable observer(s) (pers. comm.)

() - hypothetical; may occur, but confusion with similar species possible

c - common, found at more than 5 stations

Arrangement follows Logier and Toner's Check List of the Amphibians & Reptiles of Canada & Alaska (1961) for ease of comparison with its range maps, but is alphabetical within a genus. Nomenclature (scientific and vernacular) follows Conant's Field Guide to Reptiles and Amphibians of Eastern and Central North America, second edition (1975).

AMPHIBIANS AND REPTILES OF THE HAMILTON-WENTWORTH REGION

Order Caudata, Salamanders

Family Necturidae, Waterdogs

MUDPUPPY - Necturus maculosus maculosus 2

Family Ambystomatidae, Mole Salamanders

BLUE-SPOTTED SALAMANDER - Ambystoma laterale c

SPOTTED SALAMANDER - Ambystoma maculatum c

(TRIPLOID SALAMANDERS - Ambystoma platineum)

- Ambystoma tremblayi)

Family Salamandridae, Newts

RED-SPOTTED NEWT - Notophthalmus viridescens viridescens c

Family Plethodontidae, Lungless Salamanders

RED-BACKED SALAMANDER - Plethodon cinereus cinereus c

FOUR-TOED SALAMANDER - Hemidactylium scutatum 1

Order Anura, Toads and Frogs

Family Bufonidae, Toads

AMERICAN TOAD - Bufo americanus americanus c

Family Hylidae, Treefrogs and Allies

EASTERN GRAY TREEFROG - Hyla versicolor c

SPRING PEEPER - Hyla crucifer crucifer c

WESTERN CHORUS FROG - Pseudacris triseriata triseriata c

Family Ranidae, True Frogs

BULLFROG - Rana catesbeiana 4

GREEN FROG - Rana clamitans melanota c

Family Ranidae, True Frogs (cont'd.)

MINK FROG - <u>Rana septentrionalis</u> (introduced) (s.r.)	1
NORTHERN LEOPARD FROG - <u>Rana pipiens</u>	C
PICKEREL FROG - <u>Rana palustris</u>	3
WOOD FROG - <u>Rana sylvatica</u>	C

Order Testudines, Turtles

COMMON SNAPPING TURTLE - <u>Chelydra serpentina serpentina</u>	C
STINKPOT or MUSK TURTLE - <u>Sternotherus odoratus</u>	3
SPOTTED TURTLE - <u>Clemmys guttata</u> (s.r.)	1
WOOD TURTLE - <u>Clemmys insculpta</u> (s.r.)	1
BLANDING'S TURTLE - <u>Emydoidea blandingi</u>	3
MAP TURTLE - <u>Graptemys geographica</u>	2
MIDLAND PAINTED TURTLE - <u>Chrysemys picta marginata</u>	C
EASTERN SPINY SOFTSHELL - <u>Trionyx spiniferus spiniferus</u>	3

Order Squamata, Lizards, Amphisbaenians, and Snakes

Suborder Serpentes, Snakes

NORTHERN WATER SNAKE - <u>Natrix sipedon sipedon</u>	3
BROWN SNAKE - <u>Storeria dekayi dekayi</u> x <u>d. wrightorum</u>	3
RED-BELLIED SNAKE - <u>Storeria occipitomaculata</u> <u>occipitomaculata</u>	3
BUTLER'S GARTER SNAKE - <u>Thamnophis butleri</u>	1
EASTERN GARTER SNAKE - <u>Thamnophis sirtalis sirtalis</u>	C
NORTHERN RIBBON SNAKE - <u>Thamnophis sauritus</u> <u>septentrionalis</u>	4
NORTHERN RINGNECK SNAKE - <u>Diadophis punctatus edwardsi</u>	3+
EASTERN SMOOTH GREEN SNAKE - <u>Opheodrys vernalis vernalis</u>	3+
BLACK RAT SNAKE - <u>Elaphe obsoleta obsoleta</u> (s.r.)	1
EASTERN FOX SNAKE - <u>Elaphe vulpina gloydi</u> (s.r.)	2
EASTERN MILK SNAKE - <u>Lampropeltis triangulum triangulum</u>	C
EASTERN MASSASAUGA - <u>Sistrurus catenatus catenatus</u> (extinct)	1
TIMBER RATTLESNAKE - <u>Crotalus horridus horridus</u> (extinct)	2

APPENDIX 3

MAMMALS OF THE HAMILTON-WENTWORTH REGION

A mammal is any of a group of animals (including humans) that exhibit the following characteristics: mammary glands, the presence of body hair and the live birth of young (among most mammals) (Vaughan, 1972). A secretive nature, as exemplified by a preference for night time activity, is characteristic of most of the mammals in our area. Human observation of other mammals in their natural habitat is, therefore, limited.

The impact of white man, during the 200 years of his presence in this area, is readily noticed. In competing with other mammals for the use of natural areas, man has eliminated habitat essential to many mammalian species. Therefore, many species now exist in only the isolated areas within their ranges and others are dwindling in numbers. Several species have become extinct.

In the process of eliminating habitat for certain species, man has created habitat suitable for others. For example, the timber wolf was extirpated as the forest was cleared in the last century. Now the brush wolf, or coyote, has moved into the open field environment that has appeared.

Five species, the star-nosed mole, masked shrew, long-tailed weasel, short-tailed weasel, and meadow jumping mouse, have very spotty distributions but are common where they do occur.

The following list gives the species of the mammals of the Hamilton-Wentworth Region. The numbers to the right of the page give the number of stations at which a particular species has been found. Species found at more than ten stations are marked with a C.

- * - specimen in Royal Ontario Museum or reported in literature
- H - hypothetical; range is believed to include Wentworth County and has been so mapped by some authority
- P - peripheral; collected in adjacent counties
- I - introduced; originally a species alien to Canada
- E - extinct; no longer known to occur in Wentworth
- C - common

Arrangement (except for alphabetically within a genus) follows Banfield's Mammals of Canada (1974), as does scientific nomenclature. Common names agree with those used in Dagg's Mammals of Ontario (1974).

MAMMALS OF THE HAMILTON-WENTWORTH REGION

Order Marsupialia, Marsupials

Family Didelphidae, New World Opossums

VIRGINIA OPOSSUM - Didelphis virginiana virginiana* 1

Order Insectivora, Insectivores

Family Soricidae, Shrews

MASKED SHREW - Sorex cinereus cinereus* C
SMOKY SHREW - Sorex fumeus fumeus 9
WATER SHREW - Sorex palustris albibarbis* 1
PYGMY SHREW - Microsorex hoyi hoyi H
SHORT-TAILED SHREW - Blarina brevicauda talpoides* C
LEAST SHREW - Cryptotis parva parva* 1

Family Talpidae, Moles

HAIRY-TAILED MOLE - Parascalops breweri* 1
STAR-NOSED MOLE - Condylura cristata cristata* C

Order Chiroptera, Bats

Family Vespertilionidae, Smooth-faced Bats

KEEN'S BAT - Myotis keenii septentrionalis H
LITTLE BROWN BAT - Myotis lucifugus lucifugus* C
SMALL-FOOTED BAT - Myotis leibii leibii H
SILVER-HAIRED BAT - Lasionycteris noctivagans* 1
EASTERN PIPISTRELLE - Pipistrellus subflavus subflavus P
BIG BROWN BAT - Eptesicus fuscus fuscus* C
HOARY BAT - Lasiurus cinereus* 1
RED BAT - Lasiurus borealis borealis* C

Order Primates, Primates

Family Hominidae, Men

MAN - Homo sapiens C

Order Lagomorpha, Pikas, Hares, and Rabbits

Family Leporidae, Rabbits and Hares

EASTERN COTTONTAIL - <u>Sylvilagus floridanus mearnsii</u> *	C
EUROPEAN HARE - <u>Lepus europaeus hybridus</u> *	I,C
SNOWSHOE HARE - <u>Lepus americanus virginianus</u> *	2

Order Rodentia, Rodents

Family Sciuridae, Squirrels

EASTERN CHIPMUNK - <u>Tamias striatus lysteri</u> *	C
WOODCHUCK - <u>Marmota monax rufescens</u> *	C
GRAY or BLACK SQUIRREL - <u>Sciurus carolinensis pennsylvanicus</u> *	C
RED SQUIRREL - <u>Tamiasciurus hudsonicus loquax</u> *	C
NORTHERN FLYING SQUIRREL - <u>Glaucomys sabrinus macrotis</u> *	1
SOUTHERN FLYING SQUIRREL - <u>Glaucomys volans volans</u> *	1

Family Castoridae, Beavers

BEAVER - <u>Castor canadensis canadensis</u> *	1
--	---

Family Muridae, Rats, Mice, and Voles

DEER MOUSE - <u>Peromyscus maniculatus bairdii</u> *	1
DEER MOUSE - <u>Peromyscus maniculatus gracilis</u> *	1
WHITE-FOOTED MOUSE - <u>Peromyscus leucopus noveboracensis</u> *	C
SOUTHERN BOG LEMMING - <u>Synaptomys cooperi cooperi</u>	P
MUSKRAT - <u>Ondatra zibethicus zibethicus</u> *	C
MEADOW VOLE - <u>Microtus pennsylvanicus pennsylvanicus</u> *	C
WOODLAND (or PINE) VOLE - <u>Microtus pinetorum scalopsoides</u> *	1
NORWAY or BROWN RAT - <u>Rattus norvegicus norvegicus</u> *	I,C
HOUSE MOUSE - <u>Mus musculus domesticus</u> *	I,C

Family Dipodidae, Jumping Mice and Jerboas

MEADOW JUMPING MOUSE - <u>Zapus hudsonius canadensis</u> *	C
WOODLAND JUMPING MOUSE - <u>Napaeozapus insignis algonquinensis</u> *	1

Family Erethizontidae, New World Porcupines

PORCUPINE - <u>Erethizon dorsatum dorsatum</u> *	1
--	---

Order Carnivora, Carnivores

Family Canidae, Dogs

COYOTE - <u>Canis latrans</u> <u>thamnos</u> *	C
GRAY or TIMBER WOLF - <u>Canis lupus</u> <u>lycaon</u>	E
RED FOX - <u>Vulpes vulpes</u> <u>fulva</u> *	C

Family Ursidae

BLACK BEAR - <u>Ursus americanus</u> <u>americanus</u> *	E
--	---

Family Procyonidae, Raccoons and Allies

RACCOON - <u>Procyon lotor</u> <u>lotor</u> *	C
---	---

Family Mustelidae, Weasels and Allies

FISHER - <u>Martes pennanti</u>	H,E
MARTEN - <u>Martes americana</u> <u>americana</u> *	E
ERMINE or SHORT-TAILED WEASEL - <u>Mustela erminea</u> <u>cicognanii</u> *	C
LONG-TAILED WEASEL - <u>Mustela frenata</u> <u>noveboracensis</u> *	C
MINK - <u>Mustela vison</u> <u>vison</u> *	C
WOLVERINE - <u>Gulo gulo</u> <u>luscus</u>	H,E
BADGER - <u>Taxidea taxus</u> <u>jacksoni</u>	H
STRIPED SKUNK - <u>Mephitis mephitis</u> <u>nigra</u> *	C
OTTER - <u>Lontra</u> (=Lutra) <u>canadensis</u> *	E

Family Felidae, Cats

MOUNTAIN LION - <u>Felis concolor</u> <u>couguar</u>	H,E
BOBCAT - <u>Lynx rufus</u> (subspecies?)	l
LYNX - <u>Lynx lynx</u> <u>canadensis</u>	H,E

Order Artiodactyla, Cloven-hoofed or Even-toed Ungulates

Family Cervidae, Deer

WHITE-TAILED DEER - <u>Odocoileus virginianus</u> <u>borealis</u> *	C
WAPITI or AMERICAN ELK - <u>Cervus elaphus</u> <u>canadensis</u> *	E

APPENDIX 4

FISH SPECIES AND WATER QUALITY OF THE HAMILTON-WENTWORTH REGION

Scott and Crossman, in the Introduction to "Freshwater Fishes of Canada" (1973), described the compilation of the book as a "depressing experience" because so many fish species had disappeared from much of their former range, or, in a few cases, had disappeared entirely in Canada or in North America. Most of the responsibility for such disappearances lies with human activities, that block, pollute, silt, or otherwise change natural streams to make them unsuitable for certain fish species. For fish, as for most other animals, destroying a species' essential habitat can remove it just as effectively as outright killing. A number of species have disappeared from the Hamilton-Wentworth Region, largely as a result of the Region's water pollution problems. What is perhaps surprising, is the considerable number of species still found in the Region. Some are familiar sport fishes, but most are smaller, less well known species. The small species are important too, often as food for larger sport fish.

Fish are limited in where they can live by water quality, as well as by other physical factors of their environment. Hynes (1972) lists the three most important factors affecting fish in running water (streams and rivers) as temperature, rate of flow and fluctuation in flow, and the availability of suitable shelter. He states that oxygen is usually not a problem in running water because it is constantly being dissolved from the air. However, in the Hamilton-Wentworth Region, because one is not always dealing with running water, and because of the effects of water pollution, dissolved oxygen levels are very important.

Many other factors are measured in standard water quality monitoring. Most are oriented towards human water use, but some, such as turbidity, do affect sensitive species of fish. However, none of these factors are as important or as generally applicable for fish as temperatures and oxygen.

Temperature. Temperature affects the distribution of fish on broad geographical as well as very local levels (Hynes, 1972). Streams are standardly classified as warm-water (bass and sunfish) or cold-water (trout) streams. The division line is approximately 24°C (Hynes, 1972). Any stream with a maximum summer temperature of over 24°C is a warm-water stream.

Oxygen. Many of the streams in the Hamilton-Wentworth Region dry up or have very low flows in summer, and the pools that are left can easily become deoxygenated. Water pollution also lowers dissolved oxygen levels, mainly through the decomposition of organic material, for example sewage, which uses up oxygen.

Dissolved oxygen requirements for fish and other aquatic animals have been set down as follows by the Ontario Ministry of the Environment (Guidelines, 1970):

(1) Warm-water Biota

"The dissolved oxygen (DO) concentration should be above 5 mg/l at all times, except that in certain situations concentrations may range between 5 and 4 mg/l for short intervals within any 24-hour period provided that water quality is favourable in all other respects".

(2) Cold-water Biota

"In spawning areas, DO levels must not be below 7 mg/l at any time. Elsewhere, DO concentrations should be below 6 mg/l. In

certain situations, they may range between 6 and 5 mg/l for short intervals within any 24-hour period, provided the water quality is favourable in all other respects".

Flows. As mentioned above, a number of the streams in the Hamilton-Wentworth Region have very low or no flows for some time in the summer. Few fish species can survive in the pools that are left, because the pools tend to become very warm and deoxygenated. Most fish must move downstream or find deeper pools to survive (Hynes, 1972); if a whole stream dries up, as do some smaller ones in the Region, it is obviously poor fish habitat.

Shelter. While shelter is important to fish, it is difficult to measure, especially on a regional basis. Usually only local descriptions are attempted. Generally, man-made channels have far fewer sheltered areas than natural streams (Hynes, 1972), and therefore offer poorer fish habitat.

The value of considering water quality and fish populations together is that the two types of data reinforce each other. According to Hynes (1972) "It is thus possible....to describe rivers and streams in fairly general terms and to list with some degree of confidence the fish species which are likely to be found there". And, conversely, by knowing what fish species are present in a stream or lake, and something of their ecological requirements, one can predict in general terms the level of water quality.

There is one important advantage of using fish (or other aquatic animals), rather than chemical or physical tests, as indicators of water quality. A test gives a reading at only one point in time, and it may miss many fluctuations or the short-term presence of a pollutant. Fish and aquatic invertebrates reflect long-term water quality. They cannot survive any frequent

deviations from their requirements, or a single bad deviation. Species sensitive to a certain factor or factors are especially useful as water quality indicators.

All the fish species found fairly recently (Turner (1948) and following references) in the Hamilton-Wentworth Region are listed. The frequency with which the various species occur within the Region has been evaluated subjectively. Sampling of the streams and water bodies has been variable, both in frequency and thoroughness, so that no accurate guidelines, such as number of stations at which a species occurred, could be set. The values assigned are based on the number and location of stations at which a species has been found, as well as numbers of fish found. The values are as follows:

- R - rare (found in few locations and in low numbers)
- CR - common in a restricted area (or areas)
- C - common (found in several locations and in fair numbers)
- VC - very common (found in several or many locations, in large numbers)
- I - introduced
- MI - many introduced, many natural.

The nomenclature and classification of species follows that of Scott and Crossman (1973).

FISH SPECIES OF THE HAMILTON-WENTWORTH REGION

Order Amiiformes, Bowfin

Family Amiidae, Bowfin

BOWFIN - Amia calva

R

Order Clupeiformes, Herring-like Fish

Family Clupeidae, Herring

ALEWIFE - Alosa pseudoharengus

CR

GIZZARD SHAD - Dorosoma cepedianum

R

Family Salmonidae, Salmon

Subfamily Salmoninae, Salmon, Trouts, Char

RAINBOW TROUT - Salmo gairdneri

R, I

BROWN TROUT - Salmo trutta

R, I

BROOK TROUT - Salvelinus fontinalis

CR, MI

Family Umbridae, Mudminnow

CENTRAL MUDMINNOW - Umbra limi

VC

Family Esocidae, Pike

GRASS PICKEREL - Esox americanus vermiculatus

R

NORTHERN PIKE - Esox lucius

C, MI

Order Cypriniformes, Minnow or Carp

Family Cyprinidae, Minnow or carp

GOLDFISH - Carassius auratus

R, I

NORTHERN REDBELLY DACE - Chrosomus eos

VC

FINESCALE DACE - Chrosomus neogaeus

CR

REDSIDE DACE - Clinostomus elongatus

C

CARP - Cyprinus carpio

C, I

BRASSY MINNOW - Hybognathus hankinsoni

C

RIVER CHUB - Nocomis micropogon

R

GOLDEN SHINER - Notemigonus crysoleucas

R

COMMON SHINER - Notropis cornutus

C

BLACKNOSE SHINER - Notropis heterolepis

R

SPOTTAIL SHINER - Notropis hudsonius

R

SPOTFIN SHINER - Notropis spilopterus

R

BLUNTNOSE MINNOW - Pimephales notatus

C

Family Cyprinidae, Minnow or Carp (cont'd.)

FATHEAD MINNOW - <u>Pimephales promelas</u>	VC
BLACKNOSE DACE - <u>Rhinichthyes atratulus</u>	VC
LONGNOSE DACE - <u>Rhinichthyes cataractae</u>	C
CREEK CHUB - <u>Semotilus atromaculatus</u>	VC
PEARL DACE - <u>Semotilus margarita</u>	C

Family Catostomidae, Sucker

WHITE SUCKER - <u>Catostomus commersoni</u>	VC
NORTHERN HOG SUCKER - <u>Hypentelium nigricans</u>	R

Family Ictaluridae, Catfish

BROWN BULLHEAD - <u>Ictalurus nebulosus</u>	CR
TADPOLE MADTOM - <u>Noturus gyrinus</u>	R

Order Cyprinodontiformes, Killifish

Family Cyprinodontidae, Killifish

BANDED KILLIFISH - <u>Fundulus diaphanus</u>	R
--	---

Order Atheriniformes, Silverside and Flyingfish

Family Atherinidae, Silverside

BROOK SILVERSIDE - <u>Labidesthes sicculus</u>	R
--	---

Order Gasterosteiformes, Stickleback and Relatives

Family Gasterosteidae, Stickleback

BROOK STICKLEBACK - <u>Culaea inconstans</u>	VC
THREESPINE STICKLEBACK - <u>Gasterosteus aculeatus</u>	R

Order Percopsiformes, Trout-Perch

Family Percopsidae, Trout-Perch

TROUT-PERCH - <u>Percopsis omiscomaycus</u>	R
---	---

Order Perciformes, Perch-like Fish

Family Centrarchidae, Sunfish

ROCK BASS - <u>Ambloplites rupestris</u>	C
GREEN SUNFISH - <u>Lepomis cyanellus</u>	CR
PUMPKINSEED - <u>Lepomis gibbosus</u>	C
BLUEGILL - <u>Lepomis macrochirus</u>	R
SMALLMOUTH BASS - <u>Micropterus dolomieu</u>	R
LARGEMOUTH BASS - <u>Micropterus salmoides</u>	C,MI
BLACK CRAPPIE - <u>Pomoxis nigromaculatus</u>	R

Family Percidae, Perch

YELLOW PERCH - <u>Perca flavescens</u>	R
RAINBOW DARTER - <u>Etheostoma caeruleum</u>	R
FANTAIL DARTER - <u>Etheostoma flabellare</u>	CR
JOHNNY DARTER - <u>Etheostoma nigrum</u>	CR
LOGPERCH - <u>Percina caprodes</u>	R

Family Cottidae, Sculpin

MOTTLED SCULPIN - <u>Cottus bairdi</u>	R
SLIMY SCULPIN - <u>Cottus cognatus</u>	R

APPENDIX 5

UNUSUAL PLANTS OF THE HAMILTON-WENTWORTH REGION

We have noted the following plants as being of unusual occurrence in the Region. The list is developed from the personal knowledge of the individuals working on the project and from the interviews with various people. Thus, the information on which the list is based is not as complete as the other appendices. There is not a detailed compilation of the flora of the Hamilton-Wentworth Region. We have not noted, as in the other appendices, the degree of rarity of the species. However, we are of the opinion that each species mentioned is of limited distribution within the Region.

The reasons for the limited distribution of the plants are four:

- the species is at the extremity of its natural range and does not occur commonly, although it may be plentiful in other parts of its range;
- the species is normally alien and introduced to the area and has a limited distribution in the Region;
- the species occurs in habitats which have decreased in frequency. Although once more common, it is now of limited distribution;
- the species is not frequently found anywhere and is rare throughout its range.

Some species may, of course, meet several of these conditions. In our view, the last two conditions are the most important; and in the designation of areas, the plants which are of these types have been given the most weight.

In the table, a number of species are noted as being on the preliminary rare plant list for Ontario being prepared by the National Museum of Natural Sciences. These are the species which would, thus, seem to be of the most importance.

Nomenclature and taxonomy is as per Gleason, 1974. The order of the listing is, with apologies, by occurrence in the data sheets and not by taxonomic group.

LIST OF UNUSUAL PLANTS

Trees

- Black Spruce - Picea mariana
Bitternut Hickory - Carya cordiformis
*Sweet Chestnut - Castanea dentata
Chestnut Oak - Quercus muhlenbergii
*Red Mulberry - Morus rubra
*Sassafras - Sassafras albidum
*Flowering Dogwood - Cornus florida
*Tulip Tree - Liriodendron tulipifera
Tamarack - Larix laricina
Native Crab Apple - Pyrus coronaria
*Black Walnut - Juglans nigra
*Swamp White Oak - Quercus bicolor
*Tupelo - Nyssa sylvatica

Shrubs

- Leatherwood - Dirca palustris
Buttonbush - Cephalanthus occidentalis
Creeping Snowberry - Gaultheria hispidula
Small Cranberry - Vaccinium oxycoccus
Labrador Tea - Ledum groenlandicum
Huckleberry - Gaylussacia baccata
Purple Rock Clematis - Clematis occidentalis
Bladdernut - Staphylea trifolia
New Jersey Tea - Ceanothus americanus
Spicebush - Lindera benzoin
Black Alder - Ilex verticillata
Leatherleaf - Chamaedaphne calyculata
Highbush Blueberry - Vaccinium corymbosum
Bog Rosemary - Andromeda polifolia
Partridgeberry - Mitchella repens

Plants (Non-flowering)

- Virginia Chain Fern - Woodwardia virginica
Bulbet Fern - Cystopteris bulbifera
Oak Fern - Gymnocarpium Dryopteris

Plants (Non-flowering)

Ebony Spleenwort - Asplenium platyneuron
Walking Fern - Camptosarus rhizophyllus
*Purple Cliff Brake - Pallaea atropurpurea
Clinton's Fern - Dryopteris clintoniana
Silvery Spleenwort - Athyrium thelypteroides
Ground Cedar - Lycopodium complanatum

Plants (Flowering)

Naked Mitrewort - Mitella nuda
Dwarf Rattlesnake Plantain - Goodyera repens
Stemless Ladies'-Slipper - Cypripedium acaule
Showy Ladies'-Slipper - Cypripedium reginae
*Green Violet - Hybanthus concolor
Loesel's Twayblade - Liparis Loeselii
Goldthread - Coptis groenlandica
White Wild Licorice - Galium Circaezans
Three-leaved False Solomon's Seal - Smilacina trifolia
Tufted Loosestrife - Lysimachia thyrsiflora
Indian Tobacco - Lobelia inflata
White Adder's Mouth - Malaxis brachypoda
Smaller Enchanter's Nightshade - Circaea alpina
One-sided Pyrola - Pyrola secunda
Northern Green Orchis - Habenaria hyperborea
White Bog-Candle - Habenaria dilatata
Round-leaved Sundew - Drosera rotundifolia
Grass Pink Orchid - Calopogon pulchellus
Pitcher Plant - Sarracenia purpurea
Round-leaved Pyrola - Pyrola asarifolia
Starflower - Trientalis borealis
Bunchberry - Cornus canadensis
Twinsflower - Linnaea borealis
Fringed Polygala - Polygala paucifolia
Early Coral-Root - Corallorhiza trifida
Nodding Ladies-Tresses - Spiranthes cernua
Green Woodland Orchis - Habenaria clavellata
Adder's Mouth - Malaxis monophylla
Yellow Ladies'-Slipper - Cypripedium calceolus L. var. pubescens
Ram's-Head Orchid - Cypripedium arietinum
Arethusa Orchid - Arethusa bulbosa
Cardinal Flower - Lobelia cardinalis
Fringed Gentian - Gentiana crinita
*Tall Bellflower - Campanula americana
Moonseed - Menispermum canadense
White Lettuce - Prenanthes alba
Milk Vetch - Astragalus canadensis

Plants (Flowering)

- *Perfoliate Bellwort - Uvularia perfoliata
- Big Bluestem - Andropogon gerardii
- Bellwort - Uvularia grandiflora
- Wood Lily - Lilium philadelphicum
- *Wild Yam - Dioscorea villosa
- Woodland Sunflower - Helianthus divaricatus
- *Wild Aster - Aster prenanthoides
- *Yellow Mandarin - Disporum lanuginosum
- Tall Thoroughwort - Eupatorium altissimum
- Bottle Gentian - Gentiana andrewsii
- Grass-of-Parnassus - Parnassia glauca
- Calla Lily - Calla palustris
- Marsh St. John's-Wort - Hypericum virginicum
- Cotton Grass - Eriophorum angustifolium
- Long-spurred Violet - Viola rostrata
- Northern Downy Violet - Viola fimbriatula
- Marsh Blue Violet - Viola cucullata
- *Robin-Plantain - Erigeron pulchellus
- Foamflower - Tiarella cordifolia
- Pennsylvania Bittercress - Cardamine pensylvanica
- Golden Ragwort - Senecio aureus
- Indian Cucumber-Root - Medeola virginiana
- *Showy Tick-Trefoil - Desmodium canadense
- Water Avens - Geum rivale
- Turtlehead - Chelone glabra
- Water-Pennywort - Hydrocotyle americana
- Great Lobelia - Lobelia siphilitica
- Honewort - Cryptotaenia canadensis
- Spurred Gentian - Halenia deflexa
- Shinleaf - Pyrola elliptica
- Hairy Bush - Clover - Lespedeza hirta
- Night-flowering Catchfly - Silene noctiflora
- Anise-root - Osmorhiza longistylis
- Common Stitchwort - Stellaria graminea
- Pointed-leaved Tick-Trefoil - Desmodium glutinosum
- Vetch - Vicia tetrasperma
- Spring Vetch - Vicia sativa
- Pokeweed - Phytolacca americana
- Michigan Lily - Lilium michiganense
- Yellow False Foxglove - Gerardia flava
- Lizard's-Tail - Saururus cernuus
- Water Dock - Rumex orbiculatus
- Hops - Humulus Lupulus
- White Trout Lily - Erythronium albidum

* - indicates that species is included in:
G. W. Argus and D. White, 1975, A Preliminary List of Rare Plants in Ontario (Ottawa).

APPENDIX 6

ACKNOWLEDGEMENTS

Ecologists wish to thank the large number of people who gave, so generously of their time and knowledge, to this study. Many of the people listed below gave freely from their personal notes and field records. This information is listed in the body of this report as personal communication.

Tom Beechey - Nature Reserves Section, Ministry of Natural Resources
Sue Blachut - Nature Reserves Section, Ministry of Natural Resources
F. R. Cook - Department of Herpetology, Natural Museums of Canada
David Copeland - Director, Hamilton Naturalist Club
J. Cross - Graduate Student, McMaster University
Dr. E. J. Crossman - Curator of Department of Ichthyology and
Herpetology, Royal Ontario Museum
Robert Curry - Hamilton Naturalist Club
Robert Davidson - Nature Reserves Section, Ministry of Natural Resources
James Dowall - Vice-President, Hamilton Naturalist Club
Elise Dunford - Hamilton
Roy Dunford - Hamilton
Robert Edmundston - Wildlife Biologist, Halton Region Conservation
Authority
B. H. Freenstra - Ministry of Natural Resources
William Gilmore - Hamilton Naturalist Club
Valanne Glooschenko - Hamilton Naturalist Club
Dr. Walter Glooschenko - Hamilton Naturalist Club
Dr. J. Hanna - Director, Hamilton Naturalist Club
Ted Harvey - Nature Reserves Section, Ministry of Natural Resources
Dr. D. W. Hoffman - Director, Centre of Resources Development,
University of Guelph
Ruth Hopkins - Hamilton Naturalist Club
Doug Howell - Biologist, Ministry of Natural Resources
Gary Hutton - Halton Region Conservation Authority
Ron Jean-Marie - Conservation Officer, Ministry of Natural Resources
Dr. W. W. Judd - Professor of Zoology, University of Western Ontario
Dr. Paul Karrow - Professor, Earth Sciences Department, University
of Waterloo
Brian Laing - Hamilton Region Conservation Authority
Dr. L. Laking - Director, Royal Botanical Gardens
Lawrence Lamb - Ecology Laboratory, University of Waterloo
John Lamoureux - Conservationist, Royal Botanical Gardens
Jack Lord - Naturalist, Royal Botanical Gardens
Lorne MacDonald - Ontario Hydro
Ian McDonald - Nature Reserves Section, Ministry of Natural Resources
Alan Mathews - Forester, Ministry of Natural Resources
Dr. R. McLaren - Director, Hamilton Naturalist Club
George Meyers - Hamilton Naturalist Club
John Miller - Water Resources Branch, Ministry of the Environment

George North - Hamilton Naturalist Club
Laurel North - Hamilton Naturalist Club
Dr. George Peck - Royal Ontario Museum
Dr. L. Prince - McMaster University
Dr. James Pringle - Royal Botanical Gardens
Marion Shivas - President, Hamilton Naturalist Club
Robert Smith - President, Hamilton Federation of Environmental Groups
Larry Travers - Hamilton Region Conservation Authority
Freek Vrugtman - Royal Botanical Gardens
Ina Vrugtman - Royal Botanical Gardens
Martin Wernaart - Halton Region Conservation Authority
Norbert Woerns - Nature Reserves Section, Ministry of Natural Resources
Dr. C. Wood - Past President, Hamilton Naturalist Club
Sarah Wood - Hamilton Naturalist Club
Alan Wormington - Hamilton Region Conservation Authority,
Hamilton Naturalist Club

ecologistics limited

309 Lancaster Street West, Kitchener, Ontario · N2H 4V4

Tel. (519) 744-4449

October 17, 1975.

Mr. G. McKibbin,
Conservation Planner,
Hamilton Region Conservation Authority,
Box 99,
Ancaster, Ontario.
L9G 3L3

Dear Mr. McKibbin:

RE: Preparation of Sensitive Area Mapping

Pursuant to our meeting on Wednesday, I am pleased to submit for your consideration our proposal for the Sensitive Area Study.

We find the terms of reference to be specific and requiring no clarification. We do, however, suggest to you a two-phase study that would first identify the sensitive areas generally and later study them in the field. This suggestion is made for several reasons:

- the present time of year does not permit adequate field investigations;
- you have a tight deadline to meet with the Region;
- funding might be available later through SWEEP or M.O.E. to conduct the field studies.

The strategy that we see involves the initial specification of important properties and detailing of their sensitive features. This input can be utilized in the Regional Policies Plan (as in Waterloo). During the second stage, the detailed site verifications can be made, the ecological relations specified and management practices discussed/negotiated with land owners.

I feel that we at Ecologistics have the experience and resources to complete this study. I have attached, for your information, the C.V.'s of our staff who would be involved and a description of the firm's past projects. In addition to our regular staff,

we have arranged for two special advisors on this project, Paul Eagles and Craig Campbell. Mr. Eagles is familiar to you and is, of course, knowledgeable on the local environment and contacts. Mr. Campbell is a well-known naturalist and was the primary force behind the Waterloo sensitive areas policy. The following are the details of our proposal.

1. Personnel and Assignments

We would propose to assign the following people to the study, indicating the time and functions of each:

- | | |
|--------------------------|---|
| D. J. Coleman (7 days) | - study director, policy analysis |
| G. A. Ferguson (20 days) | - project manager, data collection, interviews, compilation |
| J. C. Fox (15 days) | - soils and physical resource inventories |
| D. W. Hoffman (2 days) | - advisor, physical resource inventories |
| P. Eagles (15 days) | - ecological inventories |
| C. Campbell (5 days) | - advisor, ecology |
| R. J. Planck (3 days) | - advisor, aquatic biology |

2. Budget and Financial

Based on the above time allocations, we propose the following budget allocation:

- Professional Fees
- Disbursements
- Report and Map Reproduction
(offset press, cerlox binding)

Our fees are based on A.P.E.O. Scale and we are willing to treat this as an upset limit.

3. Scheduling

We feel that the following constitutes a reasonable time frame for the study.

- | | |
|---------------------------------|----------------------|
| - initiate study | - November 10, 1975. |
| - complete inventories | - January 15, 1976. |
| - submit draft report | - January 31, 1976. |
| - submit final copies of report | - February 28, 1976. |

I trust that this information is adequate for your deliberations. I would be happy to provide you with any further information that you may require or to discuss our submission.

Yours sincerely,

D. J. Coleman

D. J. Coleman, Ph.D., M.C.I.P.
President.

DJC/kds
Enclosures

c.c. J. Shaw

HAMILTON REGION CONSERVATION AUTHORITY

Project 13 - Fill and Construction Regulations

Preparation of Sensitive Area Mapping

A. INTRODUCTION

The Hamilton Region Conservation Authority requires mapping of highly sensitive areas within the watershed. Sensitive, in this use of the word, denotes areas wherein any alteration of the landscape will cause significant detrimental impact. Maps are required detailing these areas for inclusion within the Region's Official Plan, the Authority's Watershed Management Plan and the Authority's Fill and Construction Regulations.

Those classes of sensitive areas known to exist within the watershed are listed as follows:

- a) Wetlands, swamps and bogs
- b) Areas with high water tables
- c) Porous overburden and soils
- d) Representative biological communities
- e) Significant fish spawning areas
- f) Significant wildlife breeding habitat
- g) Habitat areas of endangered species
- h) Areas of vital ecological function

B. TERMS OF REFERENCE

1. Maintain close liaison with Authority staff through regular meetings and consultation to examine the study process and, in particular, each sensitive area delineated.
2. Collect and review all existing reports, maps and information on topography, geology, soils, hydrology, land classification, air photography, etc. Conduct field investigations to provide sufficient basic background data to complete the study requirements.
3. Delineate the boundaries of each selected sensitive area on 1:25,000 inch scale topographic maps.
4. Prepare data sheets on each sensitive area detailing the following in general terms:
 - a) size and location of the site
 - b) general description of the site
 - c) geological history of the site
 - d) existing geologic, hydrologic, climatic and soils interrelationships
 - e) the ecological response to the physical environment

- f) list any significant plant or animal species
- g) location of special habitat or features
- h) any other relevant information

Photographs of each area should be included in the summary.

5. Describe those biological indicators which denote a measure of the well being of the ecosystem.
6. Prepare a general statement on acceptable land use practices in each sensitive area and why each area should be managed in a natural state.

The detrimental effects (onsite and offsite) of unacceptable land uses should be indicated.

7. Classify sensitive areas into categories of sensitivity where possible.
8. Submit 2 copies of the draft maps and text for review and approval by the staff of the Hamilton Region Conservation Authority.
9. Upon approval of the draft, submit 30 copies of the final report and 10 copies of the 1:25,000 inch maps.

C. CONSULTING AGREEMENT

The consulting firm will be expected to enter into an agreement with the Authority specifying terms of reference, consulting fee schedules, completion data and upset limit for study costs. Any subconsultants used require separate approval of the Authority.

D. PROPOSALS

The consultant shall prepare 1 copy of his proposal for review by the Authority. Cost estimates shall show amounts required for field survey, report and map preparation, as well as the upset limit for the whole study.

HAMILTON REGION CONSERVATION AUTHORITY

HIGHLY SENSITIVE AREASSELECTION CRITERIA AND POLICY GUIDELINESA. Selection Criteria

Sensitive areas are those natural landscapes including those lands and/or waters of inherent biological sensitivity, such as those areas containing aquifer recharges, headwaters, unique plants, wildlife or landforms, breeding or overwintering habitats, vital ecological functions, rare or endangered species, or other combinations of habitat and landform which could be essential for scientific research or conservation education. These sensitive areas may or may not have been significantly affected by current or past human activity and they may or may not require intensive management in order to restore, maintain or improve certain of their natural values, and they are essentially remnant areas which have not been converted to intensive urban or agricultural uses.

Criteria for selecting these highly sensitive areas for designation in Regional Official Plans and local zoning bylaws include, but are not necessarily restricted to any one or combination of the following.

1. The area represents a distinctive and unusual landform within the municipality, Ontario or Canada.
2. The area serves a vital ecological function such as maintaining the hydrologic balance over a widespread area, i.e. it serves as a water storage or recharge area.
3. The plant and/or animal associations of the area are identified as unusual or of high quality locally within the municipality, Ontario or Canada.
4. The area is an unusual habitat with limited representation in the municipality, Ontario or Canada, or a small remnant of particular habitats which have virtually disappeared within the municipality.
5. The area has an unusual diversity of local ecological sites and associated plants and animals.
6. The area provides habitat for rare or endangered species within the municipality, Ontario or Canada.
7. The combination of landforms and habitats is identified as having high aesthetic value in the context of the surrounding landscape and any alteration would significantly lower its amenity value.

8. 8. The area is large and undisturbed, potentially affording a sheltered habitat for species which are intolerant to human disturbance.
9. The area is unusually diverse in plant or animal communities, due to a variety of geomorphological features, soils, water, vegetation, and micro climatic effects.
10. The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.

B. Policy Guidelines

The regional or local municipality may establish a local advisory committee to assist with the identification, designation, regulation and management planning for highly sensitive areas. An inventory should be prepared for those areas designated as highly sensitive, which includes location of the area by reference map, a statement of the natural values represented in or by the area and the reasons for its designation, and the types of uses which would be compatible with preservation of the sensitive area. Policy guidelines for the regulation and management of sensitive areas should include the following important components.

1. As a general rule, no development is permitted in highly sensitive areas due to detrimental impact.
2. Certain public works may be carried out, subject to environmental impact analysis, provided that intrusion can be made without detrimental environmental impact and that no other feasible alternative is available.
3. Sensitive zone does not imply that areas will be purchased by a public agency or that areas are open for public use.
4. Land use designation and controls are to be specified in zoning laws, implementing regional and local official plans.
5. Municipal bylaws should permit the municipality and/or other agencies to undertake management agreements with the owners of sensitive areas.
6. The boundaries of sensitive areas shown on maps in regional and local official plans should be accepted on the understanding that precise boundaries would be established as required through an environmental impact analysis.
7. If lands designated as environmentally sensitive are proven to be endangered by a proposed, nearby change in land use, means of protection will be considered by municipal council.
8. Addition of other lands to those designated may be carried out by council resolution upon recommendation of persons or agencies, provided that detailed studies justify such an inclusion.

9. The owner of any sensitive area is not permitted to alter the conditions or use of the property in any way likely to affect the natural values for which it was designated without consent of the municipality and/or Authority.
10. Procedures for application by the owner of the property for alterations in conditions or use are to be prepared by the municipality, including those procedures for conducting an environmental impact assessment.
11. Agreements for management of designated areas may include financial cost sharing, adjustment of property assessment, rebates of property tax, definition of rights and responsibilities, provisions for public access, specific natural resource improvements, or any other provision deemed necessary to ensure continuance of the sensitive area.
12. There should be provision for minimum setbacks from any sensitive area, sufficient to ensure its preservation.
13. No alteration of a sensitive area may proceed without written permission from the municipality and/or Authority, based on site plans and management plans submitted by the owner of the sensitive area.
14. Highly sensitive areas should appear as a land use designation in any official plan or zoning bylaw and not as an overriding development control over a variety of land use designations.
15. Sensitive areas should be controlled by Conservation Authority regulations in addition to any municipal regulations or bylaws.
16. Appropriate enforcement procedures and staff must be set up to ensure effective implementation of any official plan, management plan, zoning bylaw or Authority regulation.